START2

Superfund Technical Assessment and Response Team 2 - Region VIII

United States
Environmental Protection Agency

Contract No. 68-W-00-118

ANALYTICAL RESULTS REPORT for FOCUSED SITE INSPECTION

RICO-ARGENTINE
Rico, Dolores County, Colorado

TDD No. 0308-0013

FEBRUARY 9, 2004

URS OPERATING SERVICES, INC.

In association with: Tetra Tech EM, Inc.
URS Corporation
LT Environmental, Inc.
TN & Associates, Inc.
TechLaw, Inc.

URS OPERATING SERVICES

1099 18TH STREET
SUITE 710
DENVER, COLORADO 80202-1908
TEL: (303) 296-3523
FAX: (303) 291-8296

February 9, 2004

Mr. Luke Chavez
Site Assessment Manager
U.S. Environmental Protection Agency
Region VIII, Mail Code: 8EPR-B
999 18th Street, Suite 500
Denver, Colorado 80202-2405

SUBJECT: START2, EPA Region VIII, Contract No. 68-W-00-118, TDD No. 0308-0013 Analytical Results Report for focused Site Inspection, Rico-Argentine, Rico, Dolores County, Colorado

Dear Luke:

Attached are eleven copies of the final Analytical Results Report for the focused Site Inspection of the Rico-Argentine site in Dolores County, Rico, Colorado. Sampling activities were completed between October 13 and 24, 2004. This document is submitted for your review and approval.

If you have any questions, please call me at 303-291-8229.

Very truly yours,

URS OPERATING SERVICES, INC.

Rebecca Laramie
Environmental Engineer

cc: T. F. Staible/UOS w/o attachments
File/UOS

ANALYTICAL RESULTS REPORT
for FOCUSED SITE INSPECTION

RICO-ARGENTINE
Rico, Dolores County, Colorado

CERCLIS ID# COD980952519

EPA Contract No. 68-W-00-118
TDD No. 0308-0013

Prepared By:
Rebecca Laramie, Environmental Engineer
and
Bryan Williams, Environmental Scientist

URS Operating Services, Inc.
1099 18th Street, Suite 710
Denver, CO 80202-1908

Approved: _____ Date: 2/9/04
Luke Chavez, Site Assessment Manager, EPA, Region VIII

Approved: _____ Date: 9 Feb 04
T. F. Staible, START2 Program Manager, UOS

Approved: _____ Date: 02/09/04
Rebecca Laramie, Environmental Engineer, UOS

DISTRIBUTION LIST

U.S. ENVIRONMENTAL PROTECTION AGENCY

Luke Chavez (11 copies)	Site Assessment Manager, EPA Region VIII

URS OPERATING SERVICES, INC.

Rebecca Laramie	Environmental Engineer, START2, EPA Region VIII
File (2 copies)	START2, EPA Region VIII

ANALYTICAL RESULTS REPORT for FOCUSED SITE INSPECTION

RICO-ARGENTINE
Rico, Dolores County, Colorado

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

1.0 INTRODUCTION

This Analytical Results Report (ARR) for the Rico-Argentine site in Rico, Dolores County, Colorado (CERCLIS ID # COD980952519), has been prepared to satisfy the requirements of Technical Direction Document (TDD) No.0308-0013 issued to URS Operating Services, Inc. (UOS) on August 21, 2003, by the Region VIII office of the U.S. Environmental Protection Agency (EPA). Field work at the Rico-Argentine site was conducted between October 13 and 24, 2003, and followed the applicable UOS Technical Standard Operating Procedures (TSOPs) and the Generic Quality Assurance Project Plan (QAPP) (URS Operating Services, Inc. (UOS) 2000; UOS 2001).

Field activities were conducted by UOS and included collecting 231 environmental samples comprised of 21 source samples, 190 residential soil samples, 8 surface water samples, 8 sediment samples, and 4 groundwater samples (in addition to laboratory matrix spike/matrix spike duplicates (MS/MSDs) and field testing quality assurance/quality control (QA/QC) samples) (Table 3). Residential soil samples were field tested using a Spectrace 9000® X-ray Fluorescence Spectrometer (XRF). A total of 39 residential soil samples (including 1 background sample) were sent to a commercial laboratory for confirmation analysis. In addition, all source samples, sediment samples, surface water samples, and groundwater samples were sent to a commercial laboratory for analysis.

Samples were analyzed by Paragon Analytical Laboratories, after being delivered to the laboratory by START2 personnel. Soil samples, sediment samples, and source samples were analyzed for Target Analyte List (TAL) total metals; including lead, arsenic, and mercury. Source samples, sediment samples, and selected soil samples were also analyzed for cyanide. Water samples were analyzed for TAL total and dissolved metals and cyanide. The definitive laboratory data were validated using the QA/QC procedures associated with the definitive data. Information pertaining to screening level and definitive data can be found in the Generic QAPP (UOS 2001).

2.0 OBJECTIVES

The purpose of the field activities was to gather data pertinent to the evaluation of the Rico-Argentine site with regard to the EPA's Hazard Ranking System (HRS) criteria. The specific objectives were to:

- Determine if any waste material associated with the site has impacted the Dolores River or Silver Creek;

- Determine if any waste material associated with the site has impacted any of the drinking water supplied by groundwater wells to the residents near the site; and

- Determine if any waste material associated with the site was deposited in the town of Rico and if so, whether the material poses health risks to the residents.

3.0 SITE DESCRIPTION

3.1 SITE LOCATION AND DESCRIPTION

The Rico-Argentine site is located in the San Juan Mountains of southwestern Colorado in a semiarid climate zone. The mean annual precipitation, as totaled from the University of Delaware (UD) database, is 12.8 inches. The net annual precipitation as calculated from precipitation and evaporation data obtained from the UD is 4.1 inches (University of Delaware (UD) 1986). The 2-year, 24-hour rainfall event for the site is approximately 1.5 inches (Dunne and Leopold 1978).

The Rico-Argentine site covers the mine, mill, and smelter sites located along the Dolores River, along Silver Creek, and within the town of Rico (mill sites). The Rico-Argentine site also includes portions of the Dolores River and Silver Creek near the town of Rico, and areas of the town of Rico where tailings may have been deposited (Figure 1). A brief description of the site features is included in this section. The Site Reassessment document completed by UOS in September 2003 contains a more detailed site description and history (UOS 2003a).

The site includes the town of Rico where mining waste has reportedly been deposited (U.S. Environmental Protection Agency (EPA) 1993). The site also includes areas of inactive mining and milling operations along the Dolores River and its tributary Silver Creek. The site extends northeast along Silver Creek to below the current drinking water intake for the town of Rico and north along the Dolores River to Peterson Slide, which is upgradient of the settling ponds, the heap leach pads, and the St. Louis adit (UOS 2003b, Walsh Environmental Scientists and Engineers, Inc. (WALSH) 1995). This focused Site Inspection (SI) includes the collection of samples within the town of Rico

(Figures 1, 4, 5, and 6). Soil samples were collected from areas along the Dolores River where voluntary environmental remediation has been completed and on residential properties that may be impacted by historic mining. This SI also examines the historic mining and milling operations along the Dolores River, north of Rico including the St. Louis adit, 19 settling ponds, and 2 heap leach pads (Figures 1 and 3). This area will hereafter be referred to as the St. Louis adit workings. Finally, the SI examines the area covered by the historic Argentine Mine and Mill located on Silver Creek including the reclaimed tailings piles and settling ponds (hereafter referred to as Argentine workings) (Figures 1 and 2).

A total of 19 diked settling ponds, have been used in mining and water treatment activities at the St. Louis adit workings along the Dolores River. During 1996 Ponds 16, 17, and 19 had been completely backfilled and Pond 13 had been completely drained of water, but was not backfilled. Pond 10 was full of water, but had no visible connection to the other ponds, and Ponds 1 through 4 had been allowed to become a natural wetland. At the time, only 10 ponds were being used for treating water from the St. Louis Adit. A water treatment process using quick lime began operation in 1984 and discontinued operation in 1996. The treated water, which flows into the Dolores River after flowing through Pond 5, was regulated under a National Pollutant Discharge Elimination System (NPDES) permit until January 31, 1999, when the permit expired. The settling ponds are located adjacent to and south of the former acid plant and the heap leach pads. The acid plant has been demolished. While in use, the acid plant used Ponds 11 through 18 for holding the calcine tailings. One heap leach pad is located west of the former acid plant area and the other is located in a settling pond used by the former acid plant. The heap leach pads were constructed in 1973 and 1975. Both pads were lined with a Hypalon® liner. In 1996 one of the heap leach pads was reportedly being used as a pond to hold dredged material from the uppermost settling ponds (Paser 1996). The current integrity of the liner is not known.

Historic mining activity is apparent along the Silver Creek drainage. A series of tailings piles, settling ponds, the Blaine tunnel and adit, and the Rico-Argentine mine and mill are located along Silver Creek within the site area . Reclamation activities were conducted on the tailings piles and settling ponds during a voluntary cleanup action completed in 1996 (Anderson Engineering Company (Anderson) 1997). Several other small tailings piles were noted along Silver Creek both upgradient and downgradient of the Argentine workings; however, the relative sizes of these tailings piles were small compared to the tailings located within the Argentine workings. (UOS 2003b).

Historic mining activity within the town of Rico included the operation of the Santa Cruz, Iron Clad, and Rico Boy mines, the Silver Swan mine, the Grand View smelter, and the Pro Patria mill. During a voluntary cleanup action, some of the waste piles associated with these operations were consolidated and stabilized. The waste was consolidated into what is now the reclaimed Columbia pile (UOS 2003b).

3.2 SITE HISTORY AND PREVIOUS WORK

The information provided below was obtained primarily from previous reports or interviews conducted during site activities (UOS 2003b). All sources are included.

Mining activities in the Rico area began in the 1860s when several claims were staked in the Pioneer District at the confluence of Silver Creek with the Dolores River. Silver production reached a peak in 1893. Two smelters were built in the area before 1900. Specifically a small smelter was built on the east bank of the Dolores River just north of Rico in 1880 and a second smelter was built at the southern end of town in 1884 (Paser 1996).

In 1902 all of the important mines in the district were consolidated under the United Rico Mine company, which primarily produced base metal ores. The Rico-Argentine Mining Company was formed in 1915 to produce base metal ores. A custom flotation mill was built in 1926 by the International Smelting Company, a subsidiary of Anaconda Mining Company, to concentrate the sulfide ores. The International Smelting Company operated the Falcon Mill located at the north end of Rico between 1926 and 1928. Base metal ore production peaked in 1927, but by 1928 the mill had shut down and all mining activity in the area ceased by 1932 (U.S. Geological Survey (USGS) 1974). The Rico-Argentine Mining Company resumed sporadic mining activities in 1934. Also in 1934, the St. Louis Smelting and Refining Company drove the St. Louis Tunnel and crosscut extensions into the east bank of the Dolores River, causing the tunnel to become a continuous source of mine water discharge into the Dolores River (Paser 1996).

Mining resumed steady production in 1939. A flotation mill, the Argentine Mill, was completed on Silver Creek to process ore from the Argentine Mine (Paser 1996; Colorado Department of Natural Resources, Bureau of Mines (BOM) 1939a; BOM 1939b). During 1955 a crosscut from Silver

Creek was completed to the St. Louis Tunnel (which discharges into the Dolores River) increasing the flow rate from the St. Louis adit (Paser 1996).

A sulfuric acid plant located north of the settling ponds along the Dolores River was operated between 1955 and 1964 (USGS 1974). During operation, the acid plant deposited calcine tailings into Ponds 11 through 18 (Stephens 1978). The acid plant was closed in 1964 by the state of Colorado for polluting the Dolores River. All mining operations ceased again in 1971 and most of the mine workings were allowed to flood and drain through the St. Louis Tunnel (BOM 1971).

In 1973, the Rico-Argentine Mining Company built a leach pad with the approximate dimensions of 300 feet by 500 feet (100,000 tons) next to the former sulfuric acid plant. A cyanide solution was used to leach silver and gold from raw ore from dump material from the Newman Hill area, and an overflow of an unknown quantity of leaching liquor occurred sometime in 1974 (BOM 1974). In 1975 an additional cyanide leach pad was constructed in a settling pond originally used by the acid plant (BOM 1975). A cyanide heap leach berm failed during 1975, causing an extensive fish kill in the Dolores River and resulting in the immediate closure of the site (Paser 1996).

The Anaconda Copper Company (ACC) acquired the Rico-Argentine Mine property in 1980. In response to an outstanding Notice of Violation (NOV) and a Cease and Desist Order (CDO) issued by the Colorado Department of Health, Water Quality Control Division, (now the Colorado Department of Public Health and the Environment (CDPHE)) to the Rico-Argentine Mining Company, ACC carried out several environmental efforts. The environmental efforts included building a water treatment plant at the St. Louis Tunnel discharge, capping wells, plugging adits, and stabilizing tailings areas and treatment ponds (Anaconda Minerals Company (Anaconda) 1994). Rico Development Corporation purchased the property in 1988 (Anderson 1997). Previous reports have no documentation of additional NOVs between 1980 and 1988. Because of time and budget constraints, verification of additional NOVs was not completed. In 1990, a NOV and CDO were issued by the CDPHE because of the company's failure to meet the requirements set forth in an NPDES permit, specifically for violations of the NPDES permit discharge levels of lead and silver (EPA 1994). Additional NOVs and CDOs were issued in 1990, 1993, 1994, and 1995 (Colorado Department of Public Health and the Environment (CDPHE) 1995). EPA records indicate that from January 1992 through May 1998, approximately 96 violations occurred at Rico Development Corporation's mine in Dolores County (EPA 1998). These violations included both permit

violations and violations for discharging without a permit. In addition the U.S. Department of Interior, Bureau of Reclamation, conducted surface water and sediment sampling in the Dolores River and its tributaries between 1989 and 1993. The results showed Silver Creek to be a major source of mercury and other heavy metals in the upper Dolores River Basin (U.S. Department of the Interior, Bureau of Reclamation (BOR) undated).

The Atlantic Richfield Corporation (ARCO) initiated a voluntary environmental site characterization and remediation of five source areas around the town of Rico and the surrounding area. The five areas included the Argentine tailings, Columbia tailings, Santa Cruz Mine, Silver Swan Mine, and the Grand View Smelter (CDPHE 2003). Activities occurred between July and November 1996 and included removal of waste rock and tailings material from active waterways and drainages; reconfiguration, consolidation, and stabilization of waste rock and tailings piles to minimize erosion and eliminate slope instability; implementation of source controls to reduce the generation or transport of dissolved metals and capping and erosion protection to minimize the potential for direct human exposure to mill tailings and mine waste rock; and construction of passive treatment features to reduce current metal loadings from adit discharge to receiving waters (Anderson 1997). During the 2003 field activities it appeared that at least two locations had been chosen for consolidation and stabilization of waste rock and tailings. One location along Silver Creek consists of two reclaimed tailings piles and reclaimed settling pond within the Argentine workings area and the other location is within the town of Rico and consists of a large reclaimed tailings pile (referred to in this report as the Columbia pile). The Columbia pile contains tailings and/or waste rock from sites including the Columbia tailings, Santa Cruz Mine, Silver Swan Mine, and Pro Patria Mill (UOS 2003b).

Environmental characterization studies have been completed by the EPA, CDPHE, and other government agencies since 1994. In addition, sampling has been completed by or on behalf of various property owners. Previous analytical data are summarized in several documents including a Site Reassessment completed by UOS and a Summary of Surface Water and Groundwater Data for Rico, Colorado, completed by PTI Environmental Services (UOS 2003a; PTI Environmental Services (PTI) 1995).

4.0 FIELD INVESTIGATION

4.1 SAMPLE COLLECTION METHODOLOGY

Samples were collected using dedicated equipment whenever possible. All non dedicated equipment was decontaminated between sample locations. Surface water samples, sediment samples, source samples, and residential depth soil samples were collected as grab samples. Residential surface soil samples were collected as five-point composite samples. Depth samples were collected between 6 inches and 12 inches below ground surface (bgs) and surface samples were collected between 0 and 3 inches bgs. Specific sample locations are described in Table 3 and in the specific pathway sections. No duplicate samples were collected; however, MS/MSDs were collected for both surface water and sediment samples and are described in Table 3. Sample locations, identifications, and collection times were noted in a field logbook. Additional information gathered during field activities was also documented in the field logbooks. A Global Positioning System (GPS) was used to document sample locations. Photographs were also used to document items that were deemed important.

4.2 FIELD MEASUREMENTS AND ANALYTICAL SUPPORT

Field measurements were performed on all groundwater and surface water samples collected during the field investigation. Parameters included temperature, pH, and conductivity of the water sample at the time of collection. The field measurements are presented in the following table.

TABLE 1
Field Measurements

Sample Location	pH	Temperature (°F)	Conductivity (µS/cm)	Total Dissolved Solids (ppt)
RA-GW-02	7.67	46.1	0.29	0.14
RA-GW-03	6.44	109.9	3.05	1.52
RA-GW-04	7.44	102.6	3.02	1.51
RA-GW-05	8.43	41.5	0.26	0.13
RA-SW-01	8.19	47.0	0.21	0.11
RA-SW-02	7.03	46.6	1.56	0.78
RA-SW-03	7.44	46.3	0.36	0.18

TABLE 1
Field Measurements
(continued)

Sample Location	pH	Temperature (°F)	Conductivity (µS/cm)	Total Dissolved Solids (ppt)
RA-SW-04	7.46	44.8	0.36	0.18
RA-SW-05	6.52	51.7	0.52	0.26
RA-SW-06	6.48	41.4	0.37	0.18
RA-SW-07	8.08	40.1	0.24	0.12
RA-SW-08	7.70	40.9	0.35	0.17
RA-SO-08	6.53	65.3	1.29	0.64

µS/cm Micro Siemens per centimeter
ppt Parts per thousand

Residential soil samples and some of the source samples were analyzed in the field using a Spectrace 9000® XRF. Methodology for sample preparation and field testing are described in Appendix C. Results for selected metals can be found in Table 11 and are also discussed in Section 8.4.2, XRF Results.

4.3 DATA VALIDATION AND INTERPRETATION

The sample data collected during this focused SI were reviewed using the HRS guidelines for analytical interpretation (Office of the Federal Register (OFR)1990). As reported in the analytical results in Tables 3, 4, 5, 6, 7, 8, 9, 10, and 11, elevated concentrations of analytes reported as significantly above upgradient analyte values are noted by a star (★) and are determined by sample concentrations based on the following:

- If the **upgradient** analyte concentration is greater than its Sample Quantitation Limit (SQL), and if the **release sample** analyte concentration is greater than its SQL, three times greater than the upgradient, and five times greater than the blank concentration.

- If the **upgradient** analyte concentration is not greater than its SQL and if the **release sample** analyte concentration is greater than its SQL, greater than the upgradient SQL, and five times greater than the blank analyte concentration.

All data in the tables referenced above were reported by Paragon Analytical Laboratories and validated by UOS. All data are acceptable for use as qualified in the data validation report. The complete data validation reports, and laboratory forms are attached in Appendix B. Because the samples were analyzed outside of the EPA Contract Laboratory Program (CLP), all analytes with concentrations above the respective detection limit (i.e., no U qualifier) have a concentration greater than its SQL. Likewise all analytes not detected above the detection limit (i.e., have a U qualifier) have a concentration not greater than its SQL.

5.0 SOURCE CHARACTERIZATION

5.1 SOURCE DESCRIPTIONS, SAMPLE LOCATIONS, AND ANALYTICAL RESULTS

Source sample analytical results are listed in Table 4. Source samples were collected to establish concentrations of potential contaminants associated with the historic mining activities within the area. Because of time and budget constraints, only a select number of the identified potential sources were sampled.

Samples RA-SO-01 through RA-SO-03 were collected from areas on or near the Columbia pile located along the Dolores River within the town of Rico (Figure 4). Samples RA-SO-04 through RA-SO-07 were collected from the Argentine workings area along Silver Creek approximately one mile east of the town of Rico (Figure 2). Samples RA-SO-08 through RA-SO-12 were collected from the St. Louis adit workings located north of Rico along the Dolores River (Figures 1 and 3).

Sample RA-SO-01 was collected from a reclaimed area south of the Columbia pile along the Dolores River from a depth of less than 3 inches bgs (Figure 4). This area is generally well vegetated with established cover, although shallow erosional cuts were observed leading to the river. Analytical results for sample RA-SO-01 showed concentrations of the following analytes: 42 J parts per million (ppm) arsenic; 81 ppm cadmium; 16,000 ppm lead; 0.75 ppm mercury; 66 ppm silver; and 15,000 J ppm zinc (Table 4). A "J" qualifier indicates the quantity is estimated. Using a GPS, the area of the reclaimed site/waste pile was estimated to be approximately 2 acres (UOS 2003b).

Samples RA-SO-02 and RA-SO-03 were collected from the Columbia pile along the Dolores River. This area is poorly vegetated with several erosional cuts through the cap visible on all sides. Some

of the erosional cuts appear to have been filled with rip rap (UOS 2003b). During field activities additional information about the erosional cuts was not noted. Analytical results for sample RA-SO-02 (collected from a drainage collection area immediately south of the pile) showed concentrations of several analytes, including 370 ppm lead. Sample RA-SO-03, collected from the east side of the pile at less than 4 inches bgs, showed the presence of the following analytes; 86 ppm arsenic; 9,600 ppm lead; 0.26 ppm mercury; 25 ppm silver, and 2.1 ppm cyanide. Using a GPS, the area of the Columbia pile has been estimated at 3 acres (UOS 2003b).

Sample RA-SO-04 was collected from the Blaine adit, located near the Argentine workings on Silver Creek (Figures 1 and 2). The sample was collected from the drainage pathway within the adit. From the adit opening, the drainage flowed approximately 15 feet to where it drained into Silver Creek. Analytical results for sample RA-SO-04 showed concentrations of the following analytes: 100 ppm arsenic; 4,100 ppm lead; and 11 ppm silver. At the time of the field work, there was no apparent discharge from the adit (UOS 2003b).

Sample RA-SO-05 was collected from the most eastern reclaimed area at the Argentine workings. Specifically, the sample was collected in a shallow erosional cut on the southern side of the pile from a depth of less than 3 inches bgs. This area is thinly vegetated with obvious staining of the surficial soils present. Shallow, erosional cuts were observed leading to the creek (Figure 2). Analytical results for sample RA-SO-05 showed concentrations of the following analytes: 270 ppm arsenic; 4,700 ppm lead; and 15 ppm silver. Using a GPS, the area of the reclaimed site/waste pile was estimated to be approximately 4.75 acres (UOS 2003b).

Sample RA-SO-06 was collected from the central reclaimed area at the Argentine workings, in a shallow erosional cut on the southern side of the pile from a depth of less than 4 inches bgs. This area is thinly vegetated with obvious staining of the surficial soils present; shallow, erosional cuts were observed leading to the creek (Figure 2). Analytical results for sample RA-SO-06 showed concentrations of the following analytes: 1,200 ppm lead; and 5.8 ppm silver. Using a GPS, the area of the reclaimed site/waste pile was estimated to be approximately 2.4 acres (UOS 2003b).

Sample RA-SO-07 was collected from a depth of less than 4 inches bgs from the most western reclaimed area at the Argentine workings, a former pond immediately west of the central pile (Figure 2). This area is thinly vegetated with obvious staining of the surficial soils present including along

the overland drainage pathway to Silver Creek. Analytical results for sample RA-SO-07 showed a concentration of 410 ppm lead. Using a GPS, the area of the former pond was estimated to be approximately 0.3 acres (UOS 2003b).

An aqueous source sample, RA-SO-08, was collected directly from the St. Louis adit. The adit itself has collapsed and eroded approximately 100 yards behind the entrance, and is open to surface water runoff from the slope above. The adit was estimated to have a flow rate of 75 to 80 gallons per minute during the field investigation, although the high water mark was several feet higher in the tunnel, and approximately 18 inches higher in the adit mouth. Analytical results for both total and dissolved metals indicate that the adit water does not exceed established benchmarks in the Superfund Chemical Data Matrix (SCDM) (EPA 1996).

Sample RA-SO-09 was collected from the former Pond #19 at the St. Louis adit workings located along the Dolores River (Figures 1 and 3). This pond was either buried or backfilled at the time of the field investigation, and a large pile of a dark, red-black fine grained soils was placed on the site of the former pond. A stained overland drainage path led to a small wetland (less than 0.1 acre) on the Dolores River. Analytical results for sample RA-SO-01 showed concentrations of the following analytes: 1,700 ppm lead; and 11 ppm silver. Using a GPS, the area of the pile was estimated to be approximately 0.64 acres (UOS 2003b).

Sample RA-SO-10 was collected from the area of the two former heap leach pads at the St. Louis adit workings. The leach pads had been capped with approximately 2.5 feet of soil, although in two small areas on the western edge of the pad the liner was still visible. Additionally, several monitoring wells were observed both in and around the leach pads, although they were not sampled during this field investigation. When compared to the other source analytical results, results of sample RA-SO-10 did not show significantly elevated levels of analytes (UOS 2003b).

Sample RA-SO-11 was collected from a pond not shown on available maps; therefore, the pond will be referred to as Pond #20. Runoff from the adit was re-routed to this pond (Pond #20) prior to discharging to Pond #19. Analytical results for sample RA-SO-11 showed concentrations of the following analytes: 140 J ppm arsenic; 290 ppm cadmium; 100 ppm chromium; 69 ppm cobalt; 2,300 ppm lead; and 60,000 J ppm zinc. Using a GPS, the area of the pond was estimated to be approximately 0.14 acres (UOS 2003b).

Sample RA-SO-12 was collected from Pond #16 at the St. Louis adit workings along the Dolores River (Figures 1 and 3). This pond appeared to have been drained, buried and/or filled; although, it was not known if the fill material was brought in or dredged from other ponds on site. The sample was collected from the approximate center of the former pond at a depth of less than 4 inches bgs. Analytical results for sample RA-SO-12 showed concentrations of the following analytes: 940 ppm lead; and 20 ppm silver. Using a GPS, the area of the pond was estimated to be approximately 3.1 acres (UOS 2003b).

Additionally, nine samples (RA-HA-RB-01 through RA-HA-RB-09) were collected in the floodplain of the Dolores River in the general area of the former Pro Patria Mill to determine the metals concentrations present (Figures 1 and 4). These samples were collected from an area west of River Street, south of Mantz Avenue, east of the Dolores River, and north of the Columbia pile. These samples were compared to a background soil sample collected near the U.S. Forest Service building on Highway 145 (Table 5). Every sample showed concentrations of lead at least three times above the background concentration, ranging from 1,600 ppm to 91,000 ppm. Additional analytes detected in this area at concentrations significantly above background include arsenic, up to 150 J ppm; cadmium, up to 270 ppm; mercury, up to 0.85 ppm; silver, up to 210 ppm; zinc, up to 45,000 J ppm; and cyanide, up to 26 ppm. Using a GPS, the sample locations cover an area of approximately 6.7 acres (UOS 2003b).

6.0 GROUNDWATER PATHWAY

6.1 HYDROGEOLOGIC SETTING

The geology of the Rico District is extremely complex. The dominant structure of the district is a faulted dome centered on a monzonite stock. Sedimentary strata exposed in the area are of the Ouray and Leadville limestones, overlain by the Hermosa Formation. The lowest sedimentary strata exposed in the area include the Uncompahgre Quartzite. The youngest sedimentary strata in the Rico-Argentine District is the red beds of the Cutler Formation. The lower slopes of the Rico District are generally covered by debris resulting from wash, talus, and landslide processes (USGS 1974). Surface materials in the valley sides and bottoms are glacial or stream deposits (URS Consultants, Inc. (URS) 1996).

The ore bodies in the town of Rico are relatively near the surface as the mine workings are not developed at great depth, and one, the Atlantic Cable Mine, was sunk on outcropping mineralization. A gossan deposit can be observed northeast of the town, which represents the ferruginous deposit of the upper oxidized portion of the sulfide vein. The predominant ore deposits of the Rico-Argentine site consist of 1) massive sulfide replacement deposits in limestone of the Hermosa; 2) contact metamorphic deposits of the sulfides, specularite, and magnetite in limestones; and 3) veins in fractures and small faults in lower Hermosa sandstones and arkoses (USGS 1974). The most abundant sulfide mineral is pyrite (iron sulfide). Other common sulfide minerals are sphalerite (zinc sulfide), and galena (lead sulfide) (CDPHE 1996).

Bedrock units underlying the town of Rico include the middle member of the Hermosa Formation, Leadville Limestone, Lawson Latite Porphyry, and the Uncompahgre Quartzite. The middle member of the Hermosa is composed of interbedded limestone, arkosic sandstone, and shale. There are intermittent outcrops of the Precambrian Greenstone. A wedge of coarse alluvial/colluvial valley fill is found in the Dolores and Silver Creek drainage basins (CDPHE 1996).

A shallow unconfined aquifer is located in the glacial, stream, wash, talus, and landslide debris found along the valley floors. Groundwater levels in the shallow aquifer would be greatly influenced by seasonal weather conditions and the nearby surface water bodies. Conductivity is assumed to be high, between 10^{-2} to 10^{1} centimeters per second (cm/sec) (USGS 1987). Groundwater flow is expected to follow the valley contours (URS 1996).

Deeper bedrock aquifers are found at the site. Several exploratory drill holes along the Dolores River portion of the site produced flowing water and were capped (Anaconda 1988; Anaconda 1994; URS 1996). Two exposed and several underwater geothermal springs are found along the Dolores River. Water quality data collected during the 1995 URS field investigation from the two exposed geothermal springs indicate a common source. Water flowing from these springs is depositing calcium carbonate and iron around the springs and there are visible geothermal deposits between the springs and the town of Rico (URS 1996).

6.2 GROUNDWATER TARGETS

There are no municipal water systems relying on groundwater for their potable supply (UOS 2003b). The town of Rico currently draws from a surface water intake on Silver Creek, although three wells have been installed several miles to the north, and are scheduled to be operational in the next few years. There are two private wells located approximately 1 mile south of town, and a spring 0.3 mile west of town (west of the Dolores river) that serves three residences (UOS 2003b). Based on the number of residences served by private sources of drinking water and the most current census information, it is estimated that there are fewer than ten full time residences within the study area that are not supplied with drinking water by the town of Rico. The U.S. Census Bureau lists an average of 2.35 residents per household for Dolores County (U.S. Department of Commerce, Bureau of the Census (USDOC) 2004). In addition, two springs are used by area residents as "hot pots" or bathing springs (UOS 2003b).

6.3 GROUNDWATER SAMPLE LOCATIONS

A total of four groundwater samples were collected during field activities. Figures 3 and 4 show these sample locations. Sample RA-GW-02 was collected from a private well immediately south of Rico and provides potable water for one residence. Samples RA-GW-03 and RA-GW-04 were collected from the east and west springs, located south of the St. Louis adit workings respectively. Sample RA-GW-05 was collected from the Picker spring west of town, and provides potable water for at least three residences in the community. The U.S. Forest Service maintains a Ranger station and well hydraulically upgradient of the site, but is a seasonal station and closed in early fall. Because this background groundwater sample could not be collected, groundwater results are compared to Maximum Contaminant Levels (MCLs) (EPA 1996; UOS 2003b).

6.4 GROUNDWATER ANALYTICAL RESULTS

The groundwater sample analytical results are reported in Table 6. Laboratory data and validation comments may be found in Appendix B.

The groundwater samples were analyzed using a method to detect low concentrations of the TAL metals. This was to determine if the samples had concentrations above the MCLs because two of the groundwater samples were collected from water used for drinking water.

Sample RA-GW-02 was collected from a private residence south of Rico. Neither the dissolved metals analysis, nor the total metals analysis indicated the presence of analytes at or above the respective MCLs (EPA 1996; UOS 2003b).

Sample RA-GW-03 was collected from a groundwater spring east of the Dolores River that is piped to a communal hot tub. This sample had concentrations of arsenic and beryllium above the MCLs in the total metals sample as well as in the dissolved metals sample (EPA 1996; UOS 2003b).

Sample RA-GW-04 was collected from a groundwater spring west of the Dolores River that is also used as a communal hot tub. This sample also had concentrations of arsenic and beryllium above the MCLs in the dissolved metals sample, although only arsenic was detected above the MCL in the total metals sample. (EPA 1996; UOS 2003b). EPA adopted a new MCL for arsenic in drinking water (0.01 ppm) on January 22, 2001, and public water systems must comply with the 0.01 ppm standard beginning January 23, 2006 (EPA 2002).

The final groundwater sample, RA-GW-05, was collected from a spring (Picker spring) that had been identified as a groundwater source. Further inspection, however, indicated that because of the location of the spring and the method of collection, the potable water supply from Picker spring would be classified as a surface water supply. This source serves at least three residences and did not have any analytes above their respective MCLs in either the total or dissolved water samples (EPA 1996; UOS 2003b).

6.5 GROUNDWATER PATHWAY SUMMARY

Groundwater use in the study area is limited; approximately three private wells and one potential spring were identified as sources of potable water. Because a background sample could not be collected, all groundwater samples, including the spring samples, were compared to MCLs. As such, no observed release to groundwater could be documented by data obtained from this field event.

7.0 SURFACE WATER PATHWAY

7.1 HYDROLOGIC SETTING

The Rico-Argentine site is located in the Dolores River Basin. The Dolores River and its tributary Silver Creek are the major surface water bodies in the area. The Dolores River watershed covers 544,400 acres and the Silver Creek watershed covers seven square miles (Aqua-Hab, Inc. (AHI) 2001). The Dolores River flows southward past the proposed drinking water intake for Rico, the St. Louis adit workings, and the NPDES discharge point associated with the St. Louis adit. Silver Creek flows from the east, past the current drinking water intake for Rico, the old Rico-Argentine mill site and several tailings piles, and through the town of Rico before joining the Dolores River. The 15-mile Target Distance Limit (TDL) continues southward on the Dolores River before ending upstream of McPhee Reservoir. The 41-year annual mean flow on the Dolores River, approximately four miles below the town of Rico, is 136 cubic feet per second (cfs) and the upstream drainage basin encompasses 105 square miles (USGS 1993). The flow rate of Silver Creek is approximately 10 cfs and the upstream drainage basin of Silver Creek encompasses an estimated seven square miles (Figure 2) (USGS 1976; URS 1996; USGS 1994).

7.2 SURFACE WATER TARGETS

Although the town of Rico relies on surface water for its potable supply, the intake is located on Silver Creek, upgradient of any possible site-related contamination; no other drinking water intakes were located within the 15-mile TDL. The Dolores River is a cold water fishery along its length, and is stocked by the Colorado Department of Wildlife (CDOW) with both brown and rainbow trout. Fishermen were observed catching trout during the field investigation (UOS 2003b). The ranges of several federally listed endangered species are known to extend into the study area, including the southwestern gray wolf (E), the southwestern willow flycatcher (E), the bald eagle (T), and the Canadian lynx (T) (U.S. Fish and Wildlife Service (USFWS) 2004).

7.3 SURFACE WATER SAMPLE LOCATIONS

GPS data points were collected in the field to determine exact geographic sample locations. Please refer to Figures 2 through 4, and Table 3 for sample locations and rationale. Eight surface water

samples and eight sediment samples were collected during field activities at the Rico-Argentine site. Surface water and sediment samples were collocated except that samples RA-SW-09 and RA-SD-02 were not collected. Sample locations were as follows. Background samples RA-SW/SD-01 for the Dolores River were collected approximately 6,500 feet upgradient of the St. Louis adit workings, and near the town of Rico's future wells. This sample location was well vegetated with willows and grasses, and trout were observed in the river. Samples IM-SW/SD-03 and RA-SW/SD-04 were collected immediately above and below the confluence of Silver Creek and the Dolores River, respectively. Samples RA-SW/SD-05 was collected from the Dolores River below a seep from the Columbia pile. This sample was collected from a section of the Dolores River that had braided channels. Although the sample was not collected from the main channel of the Dolores River, the side channel (where the sample was collected) was of similar size. Samples RA-SW/SD-06 were collected downstream of RA-SW/SD-05 approximately 1500 feet, below the lower reclaimed area (UOS 2003b).

Samples RA-SW/SD-07 were collected from Silver Creek upgradient of the mine and mill site, to serve as a background sample. Samples RA-SW/SD-08 were collected from Silver Creek approximately 100 feet downstream of the Argentine workings. This sample was collected to determine if contaminants potentially attributable to the Argentine tailings or the Blaine adit were impacting Silver Creek (UOS 2003b).

Sample RA-SW-02 was collected from the NPDES discharge point for the St. Louis adit on the Dolores River. Sample RA-SD-09 was collected in a small wetland on the Dolores River adjacent to the St. Louis adit workings and in the overland drainage pathway (UOS 2003b).

7.4 SURFACE WATER ANALYTICAL RESULTS

The surface water and sediment sample analytical results are reported in Tables 7 through 9. Laboratory data and validation comments may be found in Appendix B.

Total metals surface water samples from the Dolores River, downgradient of the St. Louis adit workings, show concentrations at least three times above background for calcium (up to 320 ppm), magnesium (up to 28 ppm), iron (up to 2.2 ppm), manganese (up to 0.56 ppm), potassium (up to 4.3 ppm), sodium (up to 14 ppm), and zinc (up to 0.97 ppm) (Table 7). Dissolved metals surface water

samples for the Dolores River, downgradient of the St. Louis adit workings, show concentrations at least three times above background for calcium (up to 330 ppm), magnesium (up to 30 ppm), manganese (up to 0.54 ppm), potassium (up to 4.3 ppm), sodium (up to 14 ppm), and zinc (up to 0.96 ppm) (Table 8). Sediment samples from the Dolores River, downgradient of the St. Louis adit workings, show concentrations at least three times above background for antimony (up to 10 J ppm), beryllium (up to 2.6 ppm), cadmium (up to 26 ppm), copper (up to 720 J ppm), iron (up to 370,000 ppm), lead (up to 980 ppm), manganese (up to 1,500 J ppm), silver (up to 6.5 ppm), and zinc (up to 6,500 J ppm) (Table 9). The "J" qualifier indicates an estimated quantity.

Although many of the analytes specified above maintained concentrations at least three times above background, total metals surface water sample results from the Dolores River typically decreased with the distance from the St. Louis adit workings. This trend was consistent until sample RA-SW-05 which was collected downgradient of the Columbia pile and the area along the Dolores River that was reclaimed. This sample shows concentrations at least three times above background for iron (up to 2.2 ppm), manganese (0.37 ppm), potassium (1.5 ppm), and zinc (0.94 ppm) (Table 7). Likewise dissolved metals sample results typically decreased until samples RA-SW-05 and RA-SW-06 where concentrations increased. Here the concentrations at least three times above background were detected for the following analytes: manganese (up to 0.21 ppm), potassium (up to 1.6 ppm), and zinc (up to 0.85 ppm) (Table 8). Sediment sample results from the Dolores River also decreased with distance from the St. Louis adit workings; however, concentrations of most of the analytes increased after the confluence of the Dolores River and Silver Creek (sample RA-SD-04) (Table 9). Concentrations for the following analytes were detected at least three times above background: cadmium (3.7 ppm), copper (100 ppm), lead (390 ppm), manganese (920 ppm), silver (3.8 ppm), and zinc (590 ppm). Sediment sample results again decreased until sample RA-SD-06, collected downgradient of Rico. Concentrations for the following analytes were detected at least three times above background in sample RA-SO-06: cadmium (13 ppm), copper (52 ppm), lead (980 ppm), manganese (640 ppm), silver (6.4 ppm), and zinc (2,000 ppm) (Table 9).

Total and dissolved metals surface water samples from Silver Creek, downgradient of the Argentine workings, show concentrations at least three times above background for calcium (up to 250 ppm), magnesium (40 ppm), manganese (3 ppm), potassium (3.3 ppm), and zinc (2.5 ppm) (Tables 7 and 8). Sediment samples from Silver Creek, downgradient of the Argentine workings, show concentrations at least three times above background downgradient of the mill site for aluminum

(10,000 ppm), cadmium (12 ppm), cobalt (21 ppm), copper (360 J ppm), lead (1,300 ppm), manganese (11,000 J ppm), silver (7.6 ppm), and zinc (8,700 J ppm) (Table 9).

7.5 SURFACE WATER PATHWAY SUMMARY

Runoff from the potential sources identified during the field investigation would flow westward into the Dolores River, or southward into Silver Creek, then westward to the Dolores River, where the surface water pathway continues in a southerly direction. The pathway ends before entering McPhee reservoir without encountering any drinking water intakes (UOS 2003).

Several analytes were identified in the surface water pathway at elevated concentrations, but not all of them were attributable to the potential sources identified during the field investigation. Analytes identified in both the sources and as an observed release (at concentrations at least 3 times above background) in the surface water pathway include cadmium, lead, silver, and zinc.

8.0 SOIL EXPOSURE PATHWAY

8.1 PHYSICAL CONDITIONS

The Rico- Argentine site is located at the town of Rico in the San Juan mountains of southwestern Colorado, in the former Pioneer Mining District. Mining towns and communities frequently grew around the mills, jigs, and smelters which provided employment. Historically, transportation of the raw or smelted ore, concentrated ores, ore processing operations, and construction on the former processing sites have all contributed to inorganic contaminants being deposited in these communities. In addition to the previously identified areas of concern (St. Louis adit workings, Argentine workings, and the Dolores River channel area), residential soil sampling associated with the field investigation has identified an area of soil within the town of Rico with metals at levels three times or greater than background levels.

Although three of the sources associated with the site are gated and prevent motor vehicle access, all of the sources are accessible to the public by foot and several show evidence of having been used recently for recreational purposes. In cases where a soil cap has been put in place on piles, vegetation is frequently sparse and erosional cuts have been observed in them (UOS 2003b).

8.2 SOIL TARGETS

According to LandView® V, there are a total of 210 people who live within a four-mile radius of the Rico-Argentine site, although the town of Rico estimates a population of 220 residents (UOS 2003b). The nearest residence to the residential depth soil samples where metals concentrations were more than three times background is on site. Other residences are more distant from the other potential sources. The U.S. Census Bureau lists an average of 2.35 residents per household for Dolores County(USDOC 2004). An account of the number of persons living within the four-mile radius is shown in the table below. The ranges of several federally listed endangered species are known to extend into the study area, including the southwestern gray wolf (E), the southwestern willow flycatcher (E), the bald eagle (T), and the Canadian lynx (T) (USFWS 2004).

TABLE 2
Population Breakdown

Distance from the center of the Town of Rico	Population
0-¼ mile	97
¼- ½ mile	64
½ - 1 mile	46
1 - 2miles	0
2 - 3 miles	0
3 - 4 miles	3

8.3 SOIL SAMPLING LOCATIONS

A total of 190 soil samples from approximately 56 properties were collected during field activities (Figures 5 and 6). To determine if residential properties had been impacted by historic mining and milling activities, samples were collected from all residential properties where access could be obtained. Three samples were collected from most properties: two composite surface samples (0 to 3 inches bgs) and one grab depth sample (approximately 12 inches bgs). Surface soil sample locations are depicted in Figure 6 and depth soil sample locations are depicted on Figure 5. Property samples were labeled with the six letter site and property code followed by 1S1, 1S2, and 1D1 for

surface and depth samples, respectively. Of the 56 properties, 50 had maintained houses on the property (this does not differentiate between full or part time residents or vacant houses), 2 were non-residential school property (school building and playground area), and 1 property contained a business (hotel). Several of the properties were vacant lots. Background samples RAHYFS1S1, RAHYFS1S2, and RAHYFS1D1 were collected from forest service property located north of Rico and the mining activities described in the previous sections (Figure 3). All soil samples were field tested using a portable XRF.

A total of 39 residential soil samples that were field tested using the XRF were also sent to Paragon Analytical Laboratories in Fort Collins, Colorado, for laboratory confirmation. Specifically 23 were grab depth soil samples and 16 were composite surface samples. Of the 23 depth soil samples, one sample, RAHYFS1D1, was collected from the U.S. Forest Service Ranger Station to be used as a background sample.

8.4 SOIL ANALYTICAL RESULTS

Of the 39 residential soil samples sent to Paragon Analytical Laboratories, 23 were collected as grab samples and are therefore suitable for use in evaluating the soil exposure pathway according to the HRS guidelines (Tables 10a and 10b). The remaining 16 soil samples that were analyzed in a commercial laboratory were collected as composites and are therefore not suitable for use in evaluating the soil exposure pathway according to the HRS guidelines. These laboratory results were used specifically to verify XRF results and therefore are not discussed further, but the analytical results are listed in Table 10c, and lead results are listed in Appendix A.

8.4.1 Depth Sample Laboratory Results

The soil sample laboratory results are reported in Tables 10a through 10c. Laboratory data and validation comments may be found in Appendix B. XRF results for selected metals are shown in Table 11. All XRF results are listed in Appendix A along with RPD calculations and charts comparing laboratory results and XRF results for lead.

Laboratory results from the soil samples collected within the town of Rico were compared to the depth background sample collected at the forest service property (RAHYFS1D1).

Of the 23 residential depth soil samples reported in Tables 10a and 10b, 19 samples, collected from 18 different properties, were shown to contain the following analytes at concentrations at least three times above the background concentrations; cadmium (up to 32 ppm), calcium (up to 20,000 ppm), cobalt (up to 23 ppm), copper (up to 1,600 J ppm), lead (up to 7,400 ppm), manganese (up to 3,800 ppm), silver (up to 84 J ppm), and zinc (up to 12,000 ppm). The potential source area was defined using a GPS and covers approximately 56 acres. The area includes much of the town of Rico, as well as the Dolores County School Building. Many of the analytes discussed above are associated with historical mining activities.

8.4.2 XRF Results

XRF results are listed in Appendix A. Results for metals typically associated with mining activities are also listed in Table 11.

The highest concentration of lead was detected in sample RASOHE1S2 at 18,000 ppm. Of the 56 properties sampled, 28 of the properties had at least one sample with a concentration of lead greater than or equal to 1,000 ppm. Likewise, 34 properties had at least one sample with lead concentrations greater than or equal to 800 ppm, and 46 properties had at least one sample with lead concentrations greater than or equal to 500 ppm. Sample RAEDSF1S1 had the highest concentration of arsenic (110 ppm). Samples from only 3 properties had concentrations of arsenic above 75 ppm. Because high concentrations of lead will mask the concentrations of arsenic on the XRF, several samples with the possible masking effect were sent to the laboratory for confirmation analysis. The highest concentration of arsenic in these samples was 41 ppm at sample location RAHARO1S1 (Table 11). A comparison of the laboratory and XRF lead results is located in Appendix A. In addition to the 190 soil samples field tested with the XRF, blank and duplicate samples were also field tested for QA/QC purposes. Rinsate blank samples and duplicate soil samples were prepared at a minimum of 1 per every 20 residential soil samples collected. Rinsate blank samples are identified by a "B" following the sample identifier and duplicate samples are identified by a "D" following the sample identifier. Sample results from the QA/QC samples were reviewed to ensure that both the preparation methods and the XRF run times were adequate. Results for the QA/QC samples are listed in Appendix A.

8.5 SOIL EXPOSURE PATHWAY SUMMARY

Residential soil samples collected during field activities showed that several analytes (such as cadmium, cobalt, lead, silver and zinc) had concentrations at least 3 times greater than the background concentrations. The approximate area of these elevated concentrations has been estimated at 56 acres, and includes much of the town itself. There are between 210 and 220 residents in the town of Rico.

9.0 AIR PATHWAY

Air sampling was not conducted during the field investigation for the Rico-Argentine site. Targets for the air pathway include residents of Rico, and persons who hunt, fish, and hike in the area. Vehicle tracks, shotgun shells, and other signs of recreational use were observed at several of the potential source areas. Although some of the sources were gated, none were fenced, and at one point a bicyclist and a hiker were observed on site at the St. Louis adit workings. The town of Rico has a population of approximately 220 residents and is centrally located between the three areas of contamination (UOS 2003b). The breakdown by distance ring is shown in Table 2 in Section 8.2.

The ranges of several federally listed endangered species are known to extend into the study area, including the southwestern gray wolf (E), the southwestern willow flycatcher (E), the bald eagle (T), and the Canadian lynx (T) (USFWS 2004).

10.0 SUMMARY

The Rico-Argentine site is located in the Rico Mountains of southwestern Colorado. The site includes the town of Rico where mining waste may be present. The site includes areas of inactive mining, smelting, and milling operations along the Dolores River and its tributary, Silver Creek. The site extends northeast along Silver Creek to below the current drinking water intake for the town of Rico and north along the Dolores River to Peterson Slide, which is upgradient of the settling ponds, the heap leach pads, and the St. Louis adit.

Mining activities in the Rico area began in the 1860s when several claims were staked in the Pioneer District at the confluence of Silver Creek with the Dolores River. In 1902 most mines in the district were consolidated under the United Rico Mine Company, which primarily produced base metal ores. The Rico-Argentine Mining Company was formed in 1915. Base metal ore production peaked in 1927, but by 1928 the mill had shut down and all mining activity in the area ceased by 1932. The Rico-Argentine Mining Company resumed sporadic mining activities in 1934. Mining resumed steady production in 1939. At this time the Argentine Mill was built on Silver Creek to process ore from the Argentine Mine. All mining operations ceased again in 1971. In 1973, the Rico-Argentine Mining Company built a leach pad next to a former sulfuric acid plant, located north of Rico along the Dolores River. In 1996 the Atlantic Richfield Corporation entered into an agreement with the CDPHE Voluntary Cleanup Program and addressed several sources in the area.

Metals associated with the various Rico-Argentine sources (surface impoundments, piles, and soils) include arsenic, cadmium, chromium, cobalt, lead, mercury, silver, and zinc. Cyanide was used for the leaching operations until 1975.

Groundwater use in the study area is limited; approximately three private wells were identified as sources of potable water. The Picker spring was also identified as a source of potable water; however, the source could not be confirmed as groundwater. Because no background sample could be collected, all groundwater samples, including the spring samples, were compared to MCLs. No drinking water sample was found to exceed MCLs.

Runoff associated with the Rico-Argentine site flows westward into the Dolores River, or southward into Silver Creek, then westward to the Dolores River, where the surface water pathway continues in a southerly direction. The Dolores River is considered a cold water recreational fishery by the Colorado Division of

Wildlife. The Target Distance Limit for the surface water pathway does not include the McPhee Reservoir. No drinking water intakes or habitats of threatened or endangered species were identified within the TDL. Metals identified in both the sources and as an observed release in the surface water pathway include cadmium, lead, silver, and zinc.

Residential soil samples were collected during the field investigation of the Rico-Argentine site. According to HRS guidelines, laboratory confirmation sample results indicated the presence of several metals (such as cadmium, cobalt, lead, silver and zinc) at elevated levels. A total of 190 residential soil samples were collected from approximately 56 properties within Rico. Of the 56 properties sampled, 28 of the properties had at least one sample with a concentration of lead greater than or equal to 1,000 ppm, 34 properties had at least one sample with a lead concentration greater than or equal to 800 ppm, and 46 properties had at least one sample with a lead concentration greater than or equal to 500 ppm. Additionally, several of the source areas appeared to be used by the local population for recreational purposes.

Air sampling was not conducted during the field investigation for the Rico-Argentine site. The town of Rico has a population of approximately 220 residents.

11.0 LIST OF REFERENCES

Anaconda Minerals Company (Anaconda). 1988. Letter from Robert Dent, Anaconda Minerals Environmental Manager to James B. Horn, Colorado Department of Health, Water Quality Control Division District Engineer. August 28, 1988.

Anaconda Minerals Company (Anaconda). 1994. Personal communication with Bob Dent, Minerals Environmental Manager. May 20, 1994.

Anderson Engineering Company (Anderson). 1997. Rico Mining Area Construction Completion Report Argentine Tailings, Columbia Tailings, Santa Cruz Mine, Silver Swan Mine, Grand View Smelter. Prepared for the Atlantic Richfield Company, January 1997.

Aqua-Hab, Inc. (AHI). 2001. Report of Biological and Aquatic Surveys Along the Dolores River Corridor at Rico. January 2001.

Colorado Department of Natural Resources, Bureau of Mines (BOM). 1939a. Inspectors Report prepared by District No. 4, State Mine Inspector, D. C. McNaughton. April 15, 1939.

Colorado Department of Natural Resources, Bureau of Mines (BOM). 1939b. Report to Bureau of Mines. March 18, 1939.

Colorado Department of Natural Resources, Bureau of Mines (BOM). 1971. Information Report prepared by District No. 4 Inspector. June 10, 1971.

Colorado Department of Natural Resources, Bureau of Mines (BOM). 1974. Information Report prepared by District No. 4 Metal Mining Inspector, Thomas D. High. December 5, 1974.

Colorado Department of Natural Resources, Bureau of Mines (BOM). 1975. Information Report prepared by District No. 4 Metal Mining Inspector, Thomas D. High. July 17, 1975.

Colorado Department of Public Health and the Environment (CDPHE). 1995. Letter from CDPHE Patricia Nelson, P. E. Water Quality division, to David Sell, Rico Development Corporation, regarding delinquent discharge monitoring reports for permit No. CO-0029793 Dolores County. February 10, 1995.

Colorado Department of Public Health and the Environment (CDPHE). 1996. Hazardous Materials and Waste Management Division. Soils Study Rico, Colorado. Mark Walker. August 1, 1996.

Colorado Department of Public Health and the Environment (CDPHE). 2003. Voluntary Cleanup Archive List of sites from the Internet: www.cepht.state.co.us.

Dunne, Thomas and Luna B. Leopold. 1978. "Water and Environmental Planning." W. H. Freeman and Company, San Francisco.

Office of the Federal Register (OFR). 1990. Code of Federal Regulation (CFR) 40, Part 300, "Hazard Ranking System (HRS) for Uncontrolled Hazardous Substances Releases." Appendix A of the National Oil and Hazardous Substance Release Contingency Plan; Final Rule, December 14, 1990.

Paser, Kathleen. 1996. Characterization of Treatment Recommendations for the St. Louis Adit Drainage and Associated Settling Ponds in Rico, Colorado.

PTI Environmental Services (PTI), 1995. Summary of Surface Water and Groundwater Data for Rico, Colorado . November, 1995.

Stephens Jr., F. M. 1978. Sampling and Analysis of the Rico-Argentine Calcine Tailings Pond. An unpublished report prepared by F. M. Stepens. February 1978.

U.S. Department of Commerce, Bureau of the Census (USDOC). 2004. State and County Quickfacts query for Colorado. <http://quickfacts.census.gov/qfd/states/08000.html/>. January 1, 2004.

U.S. Department of the Interior, Bureau of Reclamation (BOR). Undated. Dolores River Basin Water Quality Study 1989-1993.

U.S. Environmental Protection Agency (EPA). 1993. Record of Communication by EPA Site Assessment Manger Pat Smith and Durango Bureau of Reclamation Stan Powers. December 3, 1993.

U.S. Environmental Protection Agency (EPA). 1994. Water Management Division file review.

U.S. Environmental Protection Agency (EPA). 1996. Superfund Chemical Data Matrix. June 1996.

U.S. Environmental Protection Agency (EPA). 1998. Letter from Carol Rushin, Assistant Regional Administrator, Office of Enforcement, Compliance, and Environmental Justice, EPA to David Holm, Water Quality Control Division CDPHE regarding Notice of Violation Discharge in Violation of CDPS Permit No. CO-0029793 Section 301 (a) Clean Water Act (33. U. S. C. section 1251 et. seq.). June 19, 1998.

U.S. Environmental Protection Agency (EPA). 2002. Implementation Guidance for the Arsenic Rule and Clarifications to Compliance and New Source Contaminants Monitoring," EPA 816-F-02-013. http://www.epa.gov/safewater/ars/implement.html. August 2002.

U.S. Fish and Wildlife Service (USFWS). 2004. Threatened and Endangered Species System (TESS). Query for Colorado. <http://ecos.fws.gov/servlet/TESSSpeciesReport/generate/>. January 1, 2004.

U.S. Geological Survey (USGS). 1974. Professional Paper 723 "Geology and Ore Deposits of the Rico District, Colorado," by Edwin T. McKnight.

U.S. Geological Survey (USGS). 1976. Dolores county, Colorado-County Map Series (Topographic).

U.S. Geological Survey (USGS). 1987. Water Supply Paper 2220 "Basic Groundwater Hydrology" by Ralph C. Heath.

U.S. Geological Survey (USGS). 1993. Water Quality Data Report CO-93-2, "Water Resources Data, Colorado Water Year 1993, Volume 2, Colorado River Basin".

U.S. Geological Survey (USGS). 1994. Water Data Report CO-94-2, "Water Resources Data, Colorado Water Year 1994, Volume 2, Colorado River Basin".

University of Delaware, Center for Climate Research, Department of Geography. 1986. Terrestrial Water Budget Data Archive; Version 1.01, compiled by C. J. Willmott and C. M. Rowe.

URS Consultants, Inc. (URS). 1996. Analytical Results Report, Rico-Argentine, Dolores County, Colorado. June 19, 1996.

URS Operating Services, Inc. (UOS). 2000. "Technical Standard Operating Procedures for the Superfund Technical Assessment and Response Team (START), EPA Region VIII." September 2000.

URS Operating Services, Inc. (UOS). 2001. "Generic Quality Assurance Project Plan for the Superfund Technical Assessment and Response Team, Region VIII. February 28, 2001.

URS Operating Services, Inc. (UOS). 2003a. Site Reassessment, Rico-Argentine, Rico, Dolores County, Colorado. September 12, 2003.

URS Operating Services, Inc. (UOS). 2003b. Field Logbooks for Rico-Argentine Field Investigation, October 2003.

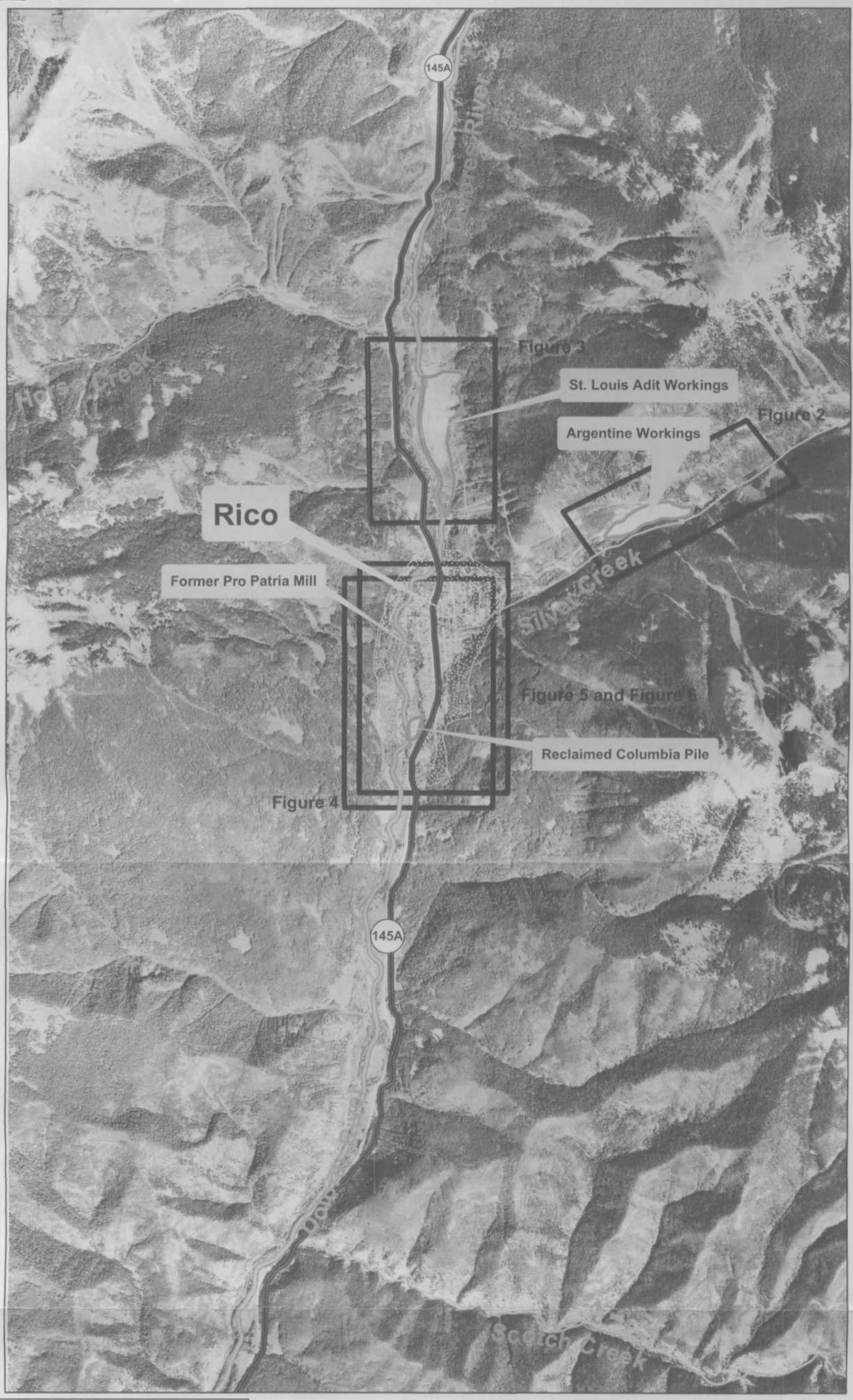
URS Operating Services, Inc. (UOS). 2003c. Field Sampling Plan for HRS Assessment, Rico-Argentine, Rico, Dolores County, Colorado. September 12, 2003.

Walsh Environmental Scientists and Engineers, Inc. (WALSH). 1995. Phase I and Phase II Environmental Site Assessment, Rico, Colorado. March 14, 1995.

Color Map(s)

The following pages contain color that does not appear in the scanned images.

To view the actual images, please contact the Superfund Records Center at (303) 312-6473.



Source: USGS Digital Orthophoto Quadrangle, 1998

0 0.2 0.4 0.8 1.2 1.6 Miles

N

S

Analytical Results Report
TDD No. 0308-0013

Rico Argentine
Rico, Dolores County, Colorado
Site Location Map
Figure 1

January 2004

Legend

- RA-SO-01 — Source Sample Location and Sample ID
- RA-SW-08 — Surface Water Sample Location and Sample ID
- RA-SO-01 — Sediment Sample Location and Sample ID

Source: USGS Digital Orthophoto Quadrangle, 1998

N

S

0 145 290 580 870 1,160 Feet

Analytical Results Report
TDD No. 0308-0013

Rico Argentine
Rico, Dolores County, Colorado
Argentine Workings-Silver Creek Sample Location Map
Figure 2

January 2004

Legend

RA-SO-01	Source Sample Location and Sample ID
RA-SW-08	Surface Water Sample Location and Sample ID
RA-SO-01	Sediment Sample Location and Sample ID
RA-GW-04	Groundwater Sample Location and Sample ID
RAARTP1D1	Residential Soil Background Sample with Laboratory Confirmation

Source: USGS Digital Orthophoto Quadrangle, 1998

N

S

0 70 140 280 420 560 Feet

Analytical Results Report
TDD No. 0308-0013

Rico Argentine
Rico, Dolores County, Colorado
St. Louis Adit Workings Sample Location Map
Figure 3

January 2004

Legend

- RA-SO-01 — Source Sample Location and Sample ID
- RA-SW-08 — Surface Water Sample Location and Sample ID
- RA-SO-01 — Sediment Sample Location and Sample ID
- RA-GW-02 — Groundwater Sample Location and Sample ID

Source: USGS Digital Orthophoto Quadrangle, 1998

N

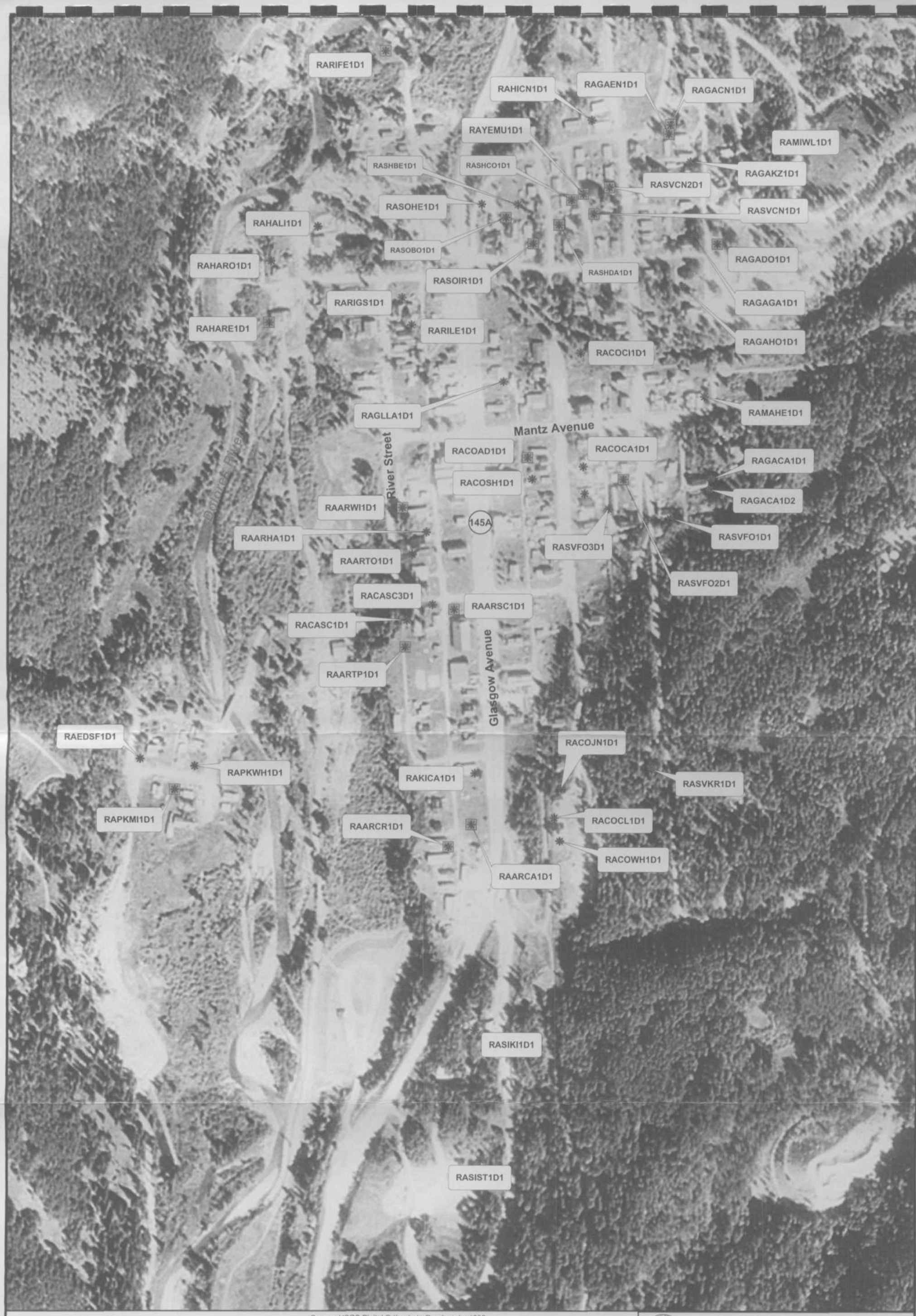
S

0 70 140 280 420 560 Feet

Analytical Results Report
TDD No. 0308-0013

Rico Argentine
Rico, Dolores County, Colorado
Dolores River/Rico Sample Location Map
Figure 4

January 2004



Analytical Results Report

TDD No. 0308-0013

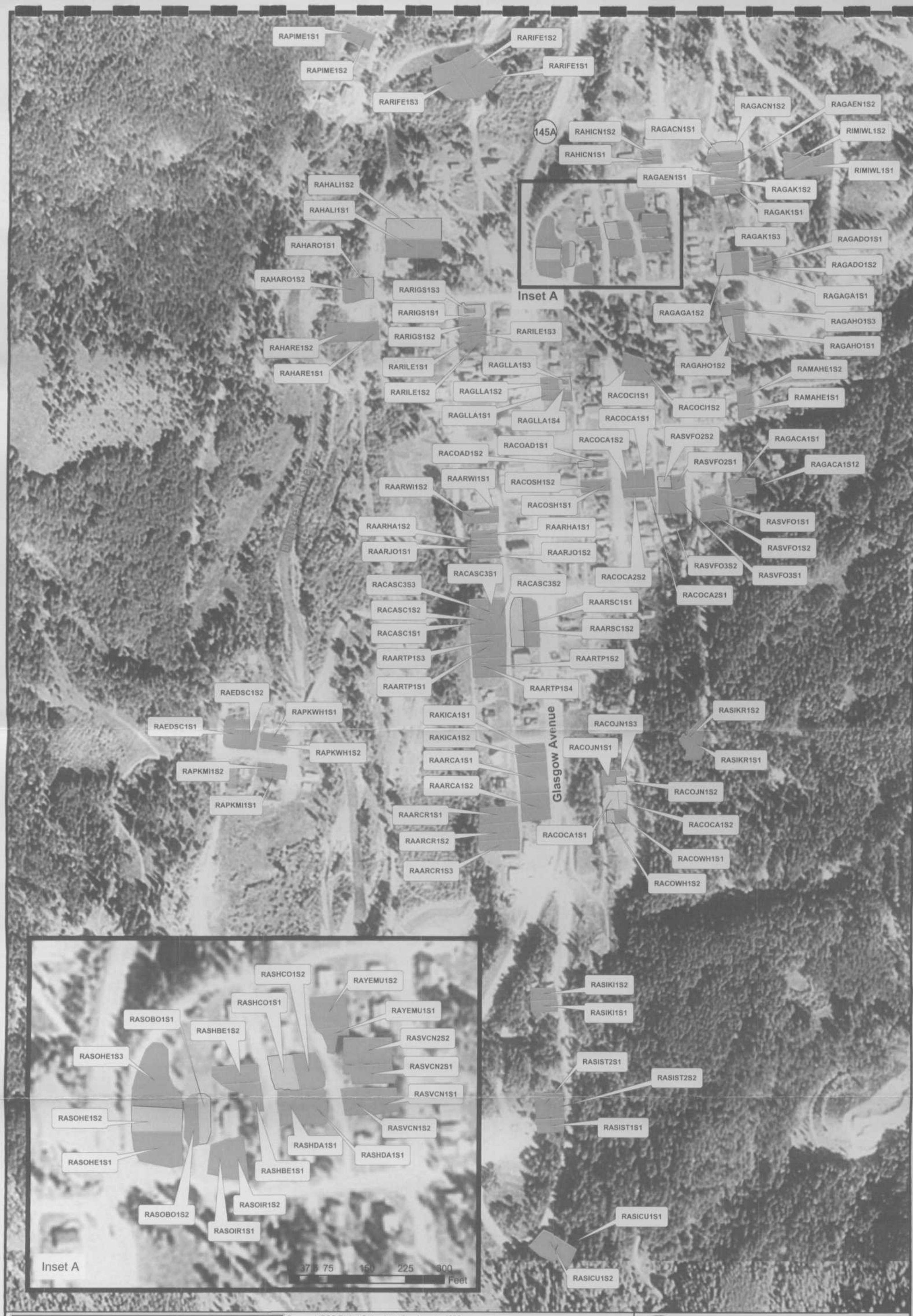
Rico Argentine

Rico, Dolores County, Colorado

Residential Depth Soil Sample Location Map

Figure 5

January 2004



Legend

RAARTP1S1 — Surface Soil Composite Sample Location and Sample ID

RASOHE1S2 — Surface Soil Composite Sample Location with Laboratory Confirmation

Source: USGS Digital Orthophoto Quadrangle, 1998

N

S

0 75 150 300 450 600
Feet

Analytical Results Report
TDD No. 0308-0013

Rico Argentine
Rico, Dolores County, Colorado
Residential Suface Soil Sample Location Map
Figure 6

January 2004

TABLE 3
Sample Locations and Rationale

Sample Matrix	Sample ID	Location	Rationale
Groundwater	RA-GW-02	Groundwater Drinking Well.	To determine if contaminants potentially attributable to the site are migrating.
	RA-GW-03	Dolores Seep.	To determine concentrations associated with seeps near the Rico-Argentine settling ponds.
	RA-GW-04	Dolores Seep.	To determine concentrations associated with seeps near the Rico-Argentine settling ponds.
	RA-GW-05	Picker Spring.	Establish background concentrations for groundwater.
Surface Water/ Sediment	RA-SW/SD-01	Dolores River background.	To establish background concentrations for the Dolores River.
	RA-SW-02	Dolores River at discharge.	To determine if contaminants potentially attributable to the site are migrating.
	RA-SW/SD-03	Dolores River before confluence.	To determine if contaminants potentially attributable to the site are migrating.
	RA-SW/SD-04	Dolores River at confluence of Silver Creek.	To determine if contaminants potentially attributable to the site are migrating.
	RA-SW/SD-05	Dolores River downgradient of tailings impoundment.	To determine if contaminants potentially attributable to the site are migrating.
	RA-SW/SD-06	Dolores River downgradient of Rico.	To determine if contaminants potentially attributable to the site are migrating.

TABLE 3
Sample Locations and Rationale
(continued)

Sample Matrix	Sample ID	Location	Rationale
Surface Water/ Sediment (continued)	RA-SW/SD-07 (MS/MSD)	Silver Creek background.	To establish background concentrations for the Silver Creek. The MS/MSD was collected to test the precision of laboratory analytical methods.
	RA-SW/SD-08	Silver Creek post tailings.	To determine if contaminants potentially attributable to the site are migrating.
	RA-SD-09	Wetlands near settling ponds at the St. Louis adit workings.	To determine if contaminants potentially attributable to the site are migrating.
Source	RA-SO-01	Erosional path from Columbia tailings impoundment.	To determine if contaminants potentially attributable to the Columbia tailings impoundment are migrating off of the site.
	RA-SO-02	Drainage path from the Columbia tailings impoundment to the Dolores River.	To determine if contaminants potentially attributable to the Columbia tailings impoundment are migrating off of the site.
	RA-SO-03	Exposed tailings from the Columbia tailings impoundment.	Establish concentrations of potential contaminants associated with the Columbia tailings impoundment.
	RA-SO-04	Southern adit draining from Rico-Argentine mine/Silver Creek drainage.	Establish concentrations of potential contaminants associated with the adit drainage.
	RA-SO-05	Exposed tailings from largest impoundment located along Silver Creek at the Rico-Argentine mine.	Establish concentrations of potential contaminants associated with the tailings.

TABLE 3
Sample Locations and Rationale
(continued)

Sample Matrix	Sample ID	Location	Rationale
Source (continued)	RA-SO-06	Exposed tailings from the middle impoundment located along Silver Creek at the Rico-Argentine mine.	Establish concentrations of potential contaminants associated with the tailings.
	RA-SO-07	Exposed tailings from the lower impoundment located along Silver Creek at the Rico-Argentine mine.	Establish concentrations of potential contaminants associated with the tailings.
	RA-SO-08	St. Louis adit outfall.	Establish concentrations of potential contaminants associated with the adit.
	RA-SO-09	Settling Pond 19.	Establish concentrations of potential contaminants associated with the settling pond.
	RA-SO-10	North side of leach pad.	Establish concentrations of potential contaminants associated with the leach pad.
	RA-SO-11	Settling Pond 20.	Establish concentrations of potential contaminants associated with the settling pond.
	RA-SO-12	Settling Pond 16.	Establish concentrations of potential contaminants associated with the settling pond.
	RAHARB01	West of Hancock Street near river bed.	Establish concentrations of potential contaminants along the Dolores River floodplain.
	RAHARB02	Pro Patria area in floodplain of Dolores River east of Hancock Street	Establish concentrations of potential contaminants along the Dolores River floodplain.
	RAHARB03	Pro Patria area on slope below Mantz Ave.	Establish concentrations of potential contaminants along the Dolores River floodplain.

TABLE 3
Sample Locations and Rationale
(continued)

Sample Matrix	Sample ID	Location	Rationale
Source (continued)	RAHARB04	Approx. 75 feet south of water tower. Slag visible.	Establish concentrations of potential contaminants along the Dolores River floodplain.
	RAHARB05	Collected east of RAHARB04. Fine material with willows present.	Establish concentrations of potential contaminants along the Dolores River floodplain.
	RAHARB06	South of County Building. Clink/Slag visible.	Establish concentrations of potential contaminants along the Dolores River floodplain.
	RAHARB07	Approx 400 ft south of county building. Fine orange material with willows present.	Establish concentrations of potential contaminants along the Dolores River floodplain.
	RAHARB08	Erosional material from east side of Columbia tailings impoundment. Orange/yellow material visible.	To determine if contaminants potentially attributable to the Columbia tailings impoundment are migrating off of the site.
	RAHARB09	Runoff area east of road and north of Columbia tailings impoundment.	To determine if contaminants potentially attributable to the Columbia tailing impoundment are migrating off of the site.
Residential Soil (190 samples)	RAHYFS1D1 RAHYFS1S1 RAHYFS1S2	Background soil samples collected at the U.S. Forest Service station north of Rico.	Document background soil conditions near Rico.
	RA__1S1 (59) RA___S2 (54) RA___S3 (13) RA__1S4 (3)	Residential surface soil samples collected in Rico.	To determine if surface soil within the town of Rico is contaminated.
	RA__1D1 (56) RA __1D2 (2)	Residential depth soil samples collected in Rico.	To determine if depth soil within the town of Rico is contaminated.

TABLE 4
Inorganic Source Sample Results
Concentrations in mg/kg (ppm)

Sample ID: / Lab Sample ID: / Location: / Analyte	(Abbrev)	RA-SO-01 0310175-13 Reclaimed Area South of Columbia Pile	RA-SO-02 0310176-1 Columbia Pile Runoff	RA-SO-03 0310176-2 Columbia Pile	RA-SO-04 0310176-3 Blaine Adit	RA-SO-05 0310176-4 East Argentine Pile	RA-SO-06 0310176-5 Central Argentine Pile	RA-SO-07 0310176-6 West Argentine Pile	RA-SO-08 0310177-__ St Louis Adit Outfall Total -5	RA-SO-08 0310177-__ St Louis Adit Outfall Dissolved -13	RA-SO-09 0310176-7 Pond #19	RA-SO-10 0310175-14 Heap Leach Pads	RA-SO-11 0310175-15 Pond #20	RA-SO-12 0310175-16 Pond #16
Aluminum	(Al)	14,000	14,000	16,000	860	4,700	9,900	11,000	1	0.2 U	4,700	6,800	95,000	4,300
Antimony	(Sb)	22 J	2.6	7.2	10	4.6	2.1 U	2.1 U	0.02 U	0.02 U	12	2.2 UJ	47 UJ	12 J
Arsenic	(As)	42 J	19	87	100	270	36	16	0.01 U	0.01 U	27	6 J	140 J	13 J
Barium	(Ba)	97 J	120	86	45	110	57	88	0.1 U	0.1 U	26	690 J	270 J	75 J
Beryllium	(Be)	0.86	0.71	1.4	0.77 U	0.57 U	0.54 U	1.1	0.005 U	0.005 U	0.82	0.54 U	45	0.58 U
Cadmium	(Cd)	81	2.8 U	6.9 U	15 U	5.7 U	1.6 U	4.6	0.03	0.03	13	0.54 U	290	12 U
Calcium	(Ca)	19,000 J	2,800	19,000	1,300	6,700	2,200	3,700	260	260	2,400	40,000 J	35,000 J	8,000 J
Chromium	(Cr)	17	28	34	1.5 U	6	6	17	0.01 U	0.01 U	3.9	8.1	100	5.5
Cobalt	(Co)	6.8	8.6	2.6	1.5 U	5.5	7.1	11	0.01 U	0.01 U	16	6.9	69	9.3
Copper	(Cu)	1,600	360	980	410	85	110	76	0.3	0.038	540	18 J	15,000 J	200 J
Iron	(Fe)	100,000 J	64,000	150,000	330,000	110,000	46,000	34,000	8.5 J	1.7 J	430,000	19,000	610,000	450,000
Lead	(Pb)	16,000	370	9,600	4,100	4,700	1,200	410	0.014	0.003 U	1,700	27	2,300	940
Magnesium	(Mg)	7,900 J	13,000	21,000	360	2,600	8,100	8,700	20	21	2,200	4,100 J	37,000 J	2,000 J
Manganese	(Mn)	2,000 J	490	1,500	69	160	1,600	1,400	2.1	2.1	460	740 J	18,000 J	560 J
Mercury	(Hg)	0.75	0.11 U	0.26	0.15 U	0.11 U	0.11 U	0.1 U	0.0002 U	0.0002 U	0.12 U	0.11 U	2.3 U	0.12 U
Nickel	(Ni)	8	22	6	3.1 U	5.7	4.5	18	0.02 U	0.02 U	23	7.2	86	13
Potassium	(K)	4,900	1,900	5,200	42,000	3,400	1,000	1,600	2.3	2.3	1,300	2,400	8,600	2,600
Selenium	(Se)	11 U	2.8 U	6.9 U	15 U	11	1.9	1.3	0.005 U	0.005 U	13	0.61	35 U	12 U
Silver	(Ag)	66	2.8	25	11	15	5.8	1.9	0.01 U	0.01 U	11	1.1 U	23 U	20
Sodium	(Na)	110 U	110 U	140 U	1,300	110 U	110 U	100 U	11	11	120 U	1,900	2,300 U	120 U
Thallium	(Tl)	21 U	5.5 U	14 U	31 U	11 U	3.2 U	2.1 U	0.01 U	0.01 U	23 U	1.1 U	70 U	23 U
Vanadium	(V)	31	29	50	36	13	30	19	0.01 U	0.01 U	18	30	110	22
Zinc	(Zn)	15,000 J	380	1,000	290	790	400	670	5.4	5.3	2,100	100 J	60,000 J	490 J
Cyanide	(CN)	0.53 U	0.55 U	2.1	0.77 U	0.57 U	0.54 U	0.52 U	0.01 U	NA	0.58 U	0.54 U	12 U	2.2

J The associated numerical value is an estimated quantity because quality control criteria were not met. Presence of the element is reliable.
U The analyte was not detected at or above the reported amount. The reported amount is the detection limit.
UJ The reported amount is estimated because quality control criteria were not met. The analyte was not detected.
★ Significance above background established according to HRS guidelines for analytical interpretation. Refer to Data Validation and Interpretation section for protocol.

TABLE 5
Contaminated Soil Source Sample Results
Concentrations in mg/kg (ppm)

Sample ID: Lab Sample ID: Location: Analyte (Abbrev)	RA-HY-FS-D1 0310174-17 Forest Service Background	RA-HA-RB-01 0310175-03 W. of Hancock St.	RA-HA-RB-02 0310175-04 Pro Patria Area	RA-HA-RB-03 0310175-05 Pro Patria Slope	RA-HA-RB-04 0310175-06 Near Water Tower	RA-HA-RB-05 0310174-11 East of RA-HA-RB-04	RA-HA-RB-06 0310174-12 ~75 ft. S of City/County Bldg.	RA-HA-RB-07 0310174-13 ~400 ft. S of City/County Bldg.	RA-HA-RB-08 0310174-14 Columbia Tailings Impoundment Erosion	RA-HA-RB-09 0310174-15 N of Columbia Tailings Impoundment
Aluminum (Al)	8,700	18,000	13,000	1,800	6,400	8,500	4,700	5,200	14,000	5,200
Antimony (Sb)	2.5 UJ	2.7 J	3.9 J	47 J	10 J	7.8 J	4.9 J	3.7 J	7.8 J	5.7 J
Arsenic (As)	13	32 J	23 J	150 J★	30 J	62★	28	13	100★	16
Barium (Ba)	140	28 J	110 J	35 J	340 J	120	110	76	92	73
Beryllium (Be)	0.74	1.8	0.67	0.57 U	0.99	0.77	0.6	0.59 U	1.2	0.56 U
Cadmium (Cd)	7.1 J	82★	34★	270★	38★	130 J★	4.1 J	13 J	16 J	16 J
Calcium (Ca)	4,600 J	100,000 J	49,000 J	9,100 J	8,700 J	4,500 J	1,600 J	2,600 J	34,000 J	2,300 J
Chromium (Cr)	12	35	35	4.8	8.4	15	7.4	11	26	12
Cobalt (Co)	6.9	15	7.6	2.1	7.6	7.6	5.8	2.9	4.9	3.4
Copper (Cu)	19 J	480 J★	300 J★	4,000 J★	410 J★	1,500 J★	240 J	160 J	750 J★	150 J
Iron (Fe)	21,000	70,000	66,000	150,000	67,000	71,000	57,000	39,000	110,000	31,000
Lead (Pb)	52	7,800★	2,200★	91,000★	3,700★	26,000★	1,600★	2,400★	3,000★	5,400★
Magnesium (Mg)	3,800	35,000 J★	10,000 J	700 J	2,000 J★	6,600★	2,700★	2,600★	6,200★	3,800★
Manganese (Mn)	740	6,600 J★	280 J	310 J	3,300 J★	800	400	100	320	140
Mercury (Hg)	0.12 U	0.34★	0.72★	0.85★	0.21★	0.17★	0.22★	0.12 U	0.11 U	0.32★
Nickel (Ni)	10	20	19	5.3	9.4	11	8.3	5.3	8.8	7.3
Potassium (K)	2,000	1,800	2,600	1,700	1,800	1,900	920	1,800	5,300	1,400
Selenium (Se)	1.5	7.5★	2.9 U	13★	3.5	4.8★	3.2	1.8 U	5.4 U	1.6
Silver (Ag)	1.2 UJ	38★	5.5	210★	14	51 J	7.6 J	15 J	24 J	17 J
Sodium (Na)	120 U	110 U	160	310	150	120 U	110 U	120 U	230	110 U
Thallium (Tl)	1.2 U	11 U	5.7 U	23 U	6.2 U	6.2 U	5.3 U	3.5 U	11 U	2.3 U
Vanadium (V)	22	29	29	17	22	24	17	20	35	22
Zinc (Zn)	2,100	15,000 J★	1,700 J	45,000 J★	7,600 J★	18,000★	650	2,000	2,600	1,300
Cyanide (CN)	0.62 U	0.55 U	0.57 U	26★	1★	2★	0.53 U	0.59 U	0.76	0.57 U

J The associated numerical value is an estimated quantity because quality control criteria were not met. Presence of the element is reliable.
U The analyte was not detected at or above the reported amount. The reported amount is the detection limit.
UJ The reported amount is estimated because quality control criteria were not met. The analyte was not detected.
★ Significance above background established according to HRS guidelines for analytical interpretation. Refer to Data Validation and Interpretation section for protocol.

TABLE 6
Groundwater Total and Dissolved Inorganic Sample Results (ppm)

Sample ID: / Lab Sample ID: / Location: / Analyte (Abbrev)	Maximum Contaminant Level	RA-GW-02 Drinking Water Well		RA-GW-03 Dolores Seep		RA-GW-04 Dolores Seep		RA-GW-05 Picker Spring	
		Total 0310177-1	Dissolved 0310177-9	Total 0310177-2	Dissolved 0310177-10	Total 0310177-3	Dissolved 0310177-11	Total 0310177-4	Dissolved 0310177-12
Aluminum (Al)	-	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Antimony (Sb)	0.006	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Arsenic (As)	0.05 (0.01)	0.01 U	0.01 U	**0.037**	**0.037**	**0.025**	**0.025**	0.01 U	0.01 U
Barium (Ba)	2.0	0.13	0.13	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Beryllium (Be)	0.004	0.005 U	0.005 U	**0.0056**	**0.0056**	0.005 U	**0.0054**	0.005 U	0.005 U
Cadmium (Cd)	0.005	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Calcium (Ca)	-	52	53	670	680	700	700	48	48
Chromium (Cr)	0.10	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Cobalt (Co)	-	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Copper (Cu)	1.3	0.17	0.014	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Iron (Fe)	-	0.14 J	0.1 UJ	7.6 J	7.2 J	5.9 J	6.9 J	0.1 UJ	0.1 UJ
Lead (Pb)	0.015	0.0054	0.003	0.006 U	0.006 U	0.006 U	0.006 U	0.003 U	0.003 U
Magnesium (Mg)	-	9.1	9.4	88	90	81	82	6	6
Manganese (Mn)	-	0.012	0.01 U	1	1	1.3	1.3	0.15	0.14
Mercury (Hg)	0.002	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Nickel (Ni)	-	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Potassium (K)	-	1 U	1.1	27	29	26	26	1 U	1
Selenium (Se)	0.050	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Silver (Ag)	-	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sodium (Na)	-	1.2	1.1	60	62	60	59	1.9	1.8
Thallium (Tl)	0.0005	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Vanadium (V)	-	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Zinc (Zn)	-	0.09	0.02 U	0.087	0.087	0.041	0.042	0.02 U	0.02 U
Cyanide (CN)	0.20	0.01 U	NA	0.01 UJ	NA	0.01 UJ	NA	0.01 U	NA

J The associated numerical value is an estimated quantity because quality control criteria were not met. Presence of the element is reliable.
U The analyte was not detected at or above the reported amount. The reported amount is the detection limit.
UJ The reported amount is estimated because quality control criteria were not met. The analyte was not detected.
NA Not analyzed.
Bold Above the MCL

TABLE 7
Surface Water Total Inorganic Sample Results (ppm)

Sample ID: Lab Sample ID: Location: Analyte (Abbrev)	Maximum Contaminant Level	RA-SW-01 0310132-7 Dolores R. Background	RA-SW-02 0310177-6 Dolores R. Discharge	RA-SW-03 0310132-9 Dolores R. before confl.	RA-SW-04 0310132-11 Dolores R. Confluence	RA-SW-05 0310132-13 Dolores R. Downg. tailings	RA-SW-06 0310132-15 Dolores R. Downg. Rico	RA-SW-07 0310177-7 Silver Creek Background	RA-SW-08 0310177-8 Silver Creek
Aluminum (Al)	-	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Antimony (Sb)	0.006	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Arsenic (As)	0.05 (0.01)	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Barium (Ba)	2.0	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.12	0.1 U
Beryllium (Be)	0.004	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Cadmium (Cd)	0.005	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Calcium (Ca)	-	35 J	320★	63 J	62 J	92 J	64 J	36	250★
Chromium (Cr)	0.10	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Cobalt (Co)	-	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Copper (Cu)	1.3	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Iron (Fe)	-	0.1U	0.48 J★	0.13	0.1 U	2.2★	0.14★	0.1 UJ	0.18 J
Lead (Pb)	0.015	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U
Magnesium (Mg)	-	5.4 J	28★	8.2 J	7.9 J	10 J	8.2	3.7	40★
Manganese (Mn)	-	0.01 U	0.56★	0.2★	0.18★	0.37★	0.22★	0.01 U	3★
Mercury (Hg)	0.002	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Nickel (Ni)	-	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Potassium (K)	-	1 U	4.3★	1.4★	1.3★	1.5★	1.3★	1 U	3.3★
Selenium (Se)	0.05	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Silver (Ag)	-	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sodium (Na)	-	2.3	14★	3.9	3.6	4.2	3.8	1.6	2.6
Thallium (Tl)	0.0005	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Vanadium (V)	-	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Zinc (Zn)	-	0.02 U	0.97★	0.02 U	0.096★	0.94★	0.081★	0.02 U	2.5★
Cyanide (CN)	0.20	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U

J The associated numerical value is an estimated quantity because quality control criteria were not met. Presence of the element is reliable.
U The analyte was not detected at or above the reported concentration.
★ Significance above background established according to HRS guidelines for analytical interpretation. Refer to Data Validation and Interpretation section for protocol.

TABLE 8
Surface Water Dissolved Inorganic Sample Results (ppm)

Sample ID: Lab Sample ID: Location: Analyte (Abbrev)	Maximum Contaminant Level	RA-SW-01 0310132-6 Dolores R. Background	RA-SW-02 0310177-14 Dolores R. Discharge	RA-SW-03 0310132-8 Dolores R. before confl.	RA-SW-04 0310132-10 Dolores R. Confluence	RA-SW-05 0310132-12 Dolores R. Downg. tailings	RA-SW-06 0310132-14 Dolores R. Downg. Rico	RA-SW-07 0310177-15 Spring Creek Background	RA-SW-08 0310177-16 Silver Creek
Aluminum (Al)	-	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Antimony (Sb)	0.006	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Arsenic (As)	0.05 (0.01)	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Barium (Ba)	2.0	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.11	0.1 U
Beryllium (Be)	0.004	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Cadmium (Cd)	0.005	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Calcium (Ca)	-	35 J	330★	62 J	62 J	92 J	64 J	37	250★
Chromium (Cr)	0.10	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Cobalt (Co)	-	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Copper (Cu)	1.3	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Iron (Fe)	-	0.1U	0.1 J	0.1 U	0.1 U	0.58	0.1 U	0.1 UJ	0.1 UJ
Lead (Pb)	0.015	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U
Magnesium (Mg)	-	5.3 J	30★	8 J	7.9 J	10 J	8.2 J	3.9	40★
Manganese (Mn)	-	0.011	0.54★	0.2★	0.18★	0.19★	0.21★	0.01 U	2.9★
Mercury (Hg)	0.002	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Nickel (Ni)	-	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Potassium (K)	-	1 U	4.3★	1.4★	1.3★	1.6★	1.4★	1 U	2.8★
Selenium (Se)	0.05	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Silver (Ag)	-	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sodium (Na)	-	2.2	14★	3.9	3.6	4.3	3.8	1.5	2.5
Thallium (Tl)	0.0005	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Vanadium (V)	-	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Zinc (Zn)	-	0.02 U	0.96★	0.02 U	0.095★	0.85★	0.087★	0.02 U	2.4★

J The associated numerical value is an estimated quantity because quality control criteria were not met. Presence of the element is reliable.
U The analyte was not detected at or above the reported concentration.
★ Significance above background established according to HRS guidelines for analytical interpretation. Refer to *Data Validation and Interpretation* section for protocol.

TABLE 9
Sediment Inorganic Sample Results (ppm)

Sample ID: / Lab Sample ID: / Location: / Analyte	(Abbrev)	RA-SD-01 0310132-1 Dolores River Background	RA-SD-09 0310175-9 Wetlands near Settling Ponds	RA-SD-03 0310132-2 Dolores R. before confl.	RA-SD-04 0310132-3 Dolores R. confl.	RA-SD-05 0310132-4 Dolores R. Downg. tailings	RA-SD-06 0310132-5 Dolores R. downg. Rico	RA-SD-07 0310175-7 Silver Creek Background	RA-SD-08 0310175-8 Silver Creek downgradient
Aluminum	(Al)	6,600	5,400	7,500	8,800	9,800	5,300	5,400	10,000★
Antimony	(Sb)	2.8 U	10 J★	3.1 U	3.5 U	2.7 U	2.6 U	2.3 UJ	9.3 J
Arsenic	(As)	9.3	16 J	12	19	15	7.9	6.8 J	48 J
Barium	(Ba)	100	42 J	120	140	67	41	94 J	96 J
Beryllium	(Be)	0.7 U	2.6★	0.77 U	0.88 U	0.93★	0.64 U	0.69	1.9
Cadmium	(Cd)	0.7 U	26★	1.1★	3.7★	1.9★	13★	1.2 U	12★
Calcium	(Ca)	26,000	11,000 J	16,000	24,000	8,400	2,900	3900 J	13,000 J
Chromium	(Cr)	8.3	5.5	8.9	11	14	7.3	11	20
Cobalt	(Co)	5.3	13	6.9	8.2	7.9	3.1	6	21★
Copper	(Cu)	12	720 J★	32	100★	62★	52★	9 J	360 J★
Iron	(Fe)	17,000	370,000★	20,000	27,000	27,000	16,000	17,000	47,000
Lead	(Pb)	15	920★	72★	390★	230★	980★	13	1,300★
Magnesium	(Mg)	7,900	2,000 J	6,100	9,700	7,800	5,300	3,800 J	8,500 J
Manganese	(Mn)	210	1,500 J★	460	920★	630★	640★	430 J	11,000 J★
Mercury	(Hg)	0.14 U	0.16 U	0.15 U	0.18 U	0.14 U	0.13 U	0.12 U	0.14 U
Nickel	(Ni)	15	20	15	18	17	5.5	10	24
Potassium	(K)	1,400	1,100	1,500	1,900	1,500	1,100	1,200	1,400
Selenium	(Se)	0.99	16 U	1.2	1.7	1.4 U	0.81	1.2 U	7.1 U
Silver	(Ag)	1.4 U	6.5★	1.5 U	3.8★	3.1★	6.4★	1.2 U	7.6★
Sodium	(Na)	140 U	160 U	150 U	180 U	140 U	130 U	120 U	140 U
Thallium	(Tl)	1.4 U	32 U	1.5 U	1.8 U	2.7 U	1.3 U	2.3 U	14 U
Vanadium	(V)	19	17	20	23	20	13	16	26
Zinc	(Zn)	63	6,500 J★	180	590★	550★	2,000★	39 J	8,700 J★
Cyanide	(CN)	0.7 U	0.79 U	0.77 U	0.88 U	0.68 U	0.64 U	0.58 U	0.71 U

J The associated numerical value is an estimated quantity because quality control criteria were not met. Presence of the element is reliable.
U The analyte was not detected at or above the reported concentration.
★ Significance above background established according to HRS guidelines for analytical interpretation. Refer to Data Validation and Interpretation section for protocol.

TABLE 10a
Laboratory Results for Residential Depth Soil Samples
Concentrations in mg/kg (ppm)

Sample ID: / Lab Sample ID: / Location: / Analyte	(Abbrev)	RAHYFS1D1 0310174-17 Background	RAARCA1D1 0310174-1	RAARCR1D1 0311167-1	RAARTP1D1 0310174-3	RAARWI1D1 031174-4	RACOAD1D1 0311167-2	RACOCA1D1 0311167-3	RASOIR1D1 0310176-11	RASVCN1D1 0311167-11	RASVCN2D1 0311167-12	RASVFO2D1 0311167-13	RAGACN1D1 0311167-4	RAGADO1D1 0311167-5
Aluminum	(Al)	8,700	15,000	5,800	8,000	8,000	12,000	12,000	8,200	13,000	14,000	9,300	13,000	12,000
Antimony	(Sb)	2.5 UJ	2.2 UJ	2 U	7.4 J	2.5 J	3★	2.7★	2.5 U	2.1 U	2.1 U	2.9★	2.1 U	2 U
Arsenic	(As)	13	18	4.9	38	18	18	16	11	14	14	13	13	30
Barium	(Ba)	140	57	410	290	170	260	200	110	150	140	290	130	120
Beryllium	(Be)	0.74	0.99	0.51 U	0.8	0.65	1	0.93	0.61 U	0.97	0.96	0.89	0.97	0.97
Cadmium	(Cd)	7.1 J	12 J	0.64	9.4 J	14 J	6.2	4.5	3.7	23★	27★	24★	24★	25★
Calcium	(Ca)	4,600 J	14,000 J★	6,300	6,500 J	3,800 J	4,900	4,700	3,100	6,400	6,700	21,000★	8,100	5,500
Chromium	(Cr)	12	22	140★	9.7	12	20	18	12	18	20	14	18	20
Cobalt	(Co)	6.9	23★	5.6	7.7	6.3	9.5	8.5	8.3	10	10	6.2	10	11
Copper	(Cu)	19 J	1,600 J★	20	310 J★	190 J★	130★	82★	73★	260★	310★	110★	260★	330★
Iron	(Fe)	21,000	60,000	18,000	40,000	30,000	30,000	32,000	25,000	35,000	32,000	21,000	32,000	49,000
Lead	(Pb)	52	2,700★	59	2,300★	4,400★	890★	600★	450★	1,900★	2,800★	1,000★	1,300★	2,900★
Magnesium	(Mg)	3,800	14,000★	4,000	3,100	3,600	6,100	6,000	3,500	6,800	8,100	4,300	6,400	8,100
Manganese	(Mn)	740	3,200★	750	3,300★	700	1,800	1,200	930	2,100	2,300★	1,400	1,900	2,100
Mercury	(Hg)	0.12 U	0.11 U	NA	0.27	0.63	NA	NA	0.16	NA	NA	NA	NA	NA
Nickel	(Ni)	10	20	12	8.9	13	15	13	11	16	16	12	19	16
Potassium	(K)	2,000	2,800	710	1,600	1,400	1,600	1,500	1,900	1,900	2,000	1,800	1,500	1,200
Selenium	(Se)	1.5	3.7	0.84	2.7	2	2.3	2.2	1.9	1.5 U	3.2	4.2	2.4	2.7
Silver	(Ag)	1.2 UJ	84 J★	1 U	10 J★	7.2 J★	8.5★	2.9★	2.4★	6.9★	9.2★	5.3★	4.5★	14★
Sodium	(Na)	120 U	110 U	170★	120 U	120 U	130★	110★	120 U	100 U	100 U	110 U	100 U	100 U
Thallium	(Tl)	1.2 U	5.5 U	1 U	3.5 U	2.4 U	2.1 U	2 U	2.5 U	3.1 U	3.1 U	2.2 U	2.1 U	3.1 U
Vanadium	(V)	22	30	24	20	23	27	27	20	26	29	19	26	28
Zinc	(Zn)	2,100	1,900	130	2,600	1,600	1,100	760	500	4,300	4,400	4,000	5,700	3,800
Cyanide	(CN)	0.624	0.55 U	NA	0.58 U	0.96	NA	NA	0.61 U	NA	NA	NA	NA	NA

J The associated numerical value is an estimated quantity because quality control criteria were not met. Presence of the element is reliable.
U The analyte was not detected at or above the reported amount. The reported amount is the detection limit.
UJ The reported amount is estimated because quality control criteria were not met. The analyte was not detected.
★ Significance above background established according to HRS guidelines for analytical interpretation. Refer to Data Validation and Interpretation section for protocol.

TABLE 10b
Laboratory Results for Residential Depth Soil Samples
Concentrations in mg/kg (ppm)

Sample ID: / Lab Sample ID: / Location: / Analyte	(Abbrev)	RAHYFS1D1 0310174-17 Background	RAGAEN1D1 0311167-6	RAHARE1D1 0311167-7	RAHARO1D1 0311167-8	RAPKMI1D1 0310174-18	RARIFE1D1 0310174-19	RASOHE1D1 030176-9	RASDGR1D1 0310175-10	RASHDA1D1 0310175-12	RASOBO1D1 0311167-10	RAYEMU1D1 0311167-14	RASHCO1D1 0311167-9
Aluminum	(Al)	8,700	11,000	8,700	9,800	13,000	9,300	9,700	5,200	11,000	11,000	13,000	14,000
Antimony	(Sb)	2.5 UJ	2.1 U	3.3★	3★	2.4 UJ	2.4 UJ	6.4★	2.1 UJ	2.3 UJ	6.6★	2 U	2 U
Arsenic	(As)	13	13	21	16	9.1	17	29	5.9 J	13 J	21	26	15
Barium	(Ba)	140	130	100	99	130	190	130	260 J	90 J	120	100	84
Beryllium	(Be)	0.74	0.73	0.71	1.1	0.9	1	1.2	0.55	0.83	0.96	0.94	1
Cadmium	(Cd)	7.1 J	14	21	32★	1.5 J	2.9 J	75	0.52	4.1	15	20	28★
Calcium	(Ca)	4,600 J	7,000	3,000	14,000★	5,800 J	5,300 J	20,000★	5,000 J	3,000 J	4,700	4,200	4,900
Chromium	(Cr)	12	18	14	16	19	14	16	7.8	18	16	19	21
Cobalt	(Co)	6.9	8.2	8.8	10	12	9.6	10	5.1	8.6	10	11	18
Copper	(Cu)	19 J	190★	410★	420★	74 J★	55 J	270★	12 J	110 J★	180★	240★	220★
Iron	(Fe)	21,000	32,000	34,000	37,000	26,000	26,000	34,000	15,000	25,000	30,000	38,000	35,000
Lead	(Pb)	52	1,500★	4,100★	4,300★	99	240★	7,400★	16	550★	1,900★	1,800★	1,300★
Magnesium	(Mg)	3,800	5,200	4,800	8,500	5,700	4,500	10,000	3,300 J	6,800 J	6,100	7,100	7,800
Manganese	(Mn)	740	1,200	1,200	2,000	1,400	1,200	3,800★	520 J	1,200 J	2,300★	1,600	1,800
Mercury	(Hg)	0.12 U	NA	NA	NA	0.12 U	2.2★	0.21	0.1 U	0.11 U	NA	NA	NA
Nickel	(Ni)	10	13	10	12	14	15	19	7.9	14	14	16	20
Potassium	(K)	2,000	1,400	1,300	1,100	2,300	1,800	1,800	1,100	1,500	2,000	1,500	1,400
Selenium	(Se)	1.5	2.3	2.3	2.2	1.2 U	1.6	8.2★	0.69	1.1	1.6	1.5 U	1.5
Silver	(Ag)	1.2 UJ	4.3★	16★	21★	1.2 UJ	2.4 J	58★	1 U	1.2★	16★	5.6★	4.8★
Sodium	(Na)	120 U	100 U	100 U	100 U	120 U	120 U	110 U	100 U	110 U	100 U	100 U	130★
Thallium	(Tl)	1.2 U	2.1 U	2 U	2 U	2.4 U	2.4 U	11 U	1 U	2.3 U	3.1 U	3.1 U	2 U
Vanadium	(V)	22	25	22	21	33	26	19	18	27	26	27	27
Zinc	(Zn)	2,100	3,000	3,100	4,800	310	480	12,000★	110 J	720 J	1,900	3,400	4,000
Cyanide	(CN)	0.62 U	NA	NA	NA	0.60 U	0.61 U	0.56 U	0.52 U	0.57	NA	NA	NA

J The associated numerical value is an estimated quantity because quality control criteria were not met. Presence of the element is reliable.
U The analyte was not detected at or above the reported concentration.
★ Significance above background established according to HRS guidelines for analytical interpretation. Refer to Data Validation and Interpretation section for protocol.
UJ The reported amount is estimated because quality control criteria were not met. The analyte was not detected.
★ Significance above background established according to HRS guidelines for analytical interpretation. Refer to Data Validation and Interpretation section for protocol.

TABLE 10c
Laboratory Results for Residential Surface Soil Samples
Concentrations in mg/kg (ppm)

Sample ID: / Lab Sample ID: / Location: / Analyte (Abbrev)		RAARSC1S2 0310174-2	RAHARO1S1 0310174-16	RASHCO1S1 0310175-11	RASOBO1S1 0310176-8	RAGAHO1S2 0310174-10	RACOAD1S2 0310174-5	RAGLLA1S4 0310175-1	RAHALI1S2 0310175-2	RAGAGA1S2 0310174-9	RASOHE1S2 030176-10	RAGACN1S2 0310174-8	RACOJN1S2 0310174-6	RACOWH1S2 0310174-7	RARIGS1S3 0310174-20	RASVFO2S2 0310176-12
Aluminum	(Al)	10,000	8,300	15,000	6,900	8,300	11,000	11,000	9,400	10,000	9,200	13,000	10,000	9,500	13,000	9,300
Antimony	(Sb)	2.3 UJ	3 J	2.2 UJ	2.3 U	2.2 UJ	2.5 J	2.4 J	2.2 UJ	4 UJ	20	2.7 J	2.2 UJ	2.2 UJ	2.5 UJ	4
Arsenic	(As)	11	41	18 J	6.8	8.7	15	13 J	16 J	11	24	17	20	21	9.5	19
Barium	(Ba)	130	110	120 J	140	130	220	150 J	130 J	110	170	100	260	130	230	230
Beryllium	(Be)	0.83	1.3	1.1	0.68	0.69	0.92	0.86	0.82	0.69	0.83	0.92	0.94	0.82	0.81	0.77
Cadmium	(Cd)	6.6 J	43 J	29	2.7	2.8 J	4.5 J	6.1	6.3	7.5 J	60	22 J	5.9 J	8.3 J	5.3 J	12
Calcium	(Ca)	5,000 J	5,900 J	8,000 J	4,600	4,000 J	5,300 J	5,600 J	4,200 J	3,800 J	10,000	6,300 J	4,100 J	5,600 J	6,900 J	12,000
Chromium	(Cr)	14	50	23	9.4	12	19	16	13	16	14	16	13	14	19	14
Cobalt	(Co)	8.9	18	11	5.6	7.6	7.9	8.3	7.8	8.2	9.4	11	9.5	8.8	7.5	6.9
Copper	(Cu)	67 J	740 J	190 J	37	39 J	110 J	73 J	87 J	110 J	380	210 J	85 J	120 J	74 J	160
Iron	(Fe)	26,000	65,000	36,000	15,000	19,000	30,000	23,000	25,000	27,000	37,000	34,000	25,000	26,000	24,000	42,000
Lead	(Pb)	440	5,400	2,000	440	310	760	510	580 J	610	41,000	1,400	410	600	700	1,300
Magnesium	(Mg)	5,900	6,300	8,900 J	3,300	4,400	5,800	5,700 J	5,700 J	5,800	7,900	6,900	4,900	6,500	9,100	5,100
Manganese	(Mn)	1,100	1,900	2,200 J	760	1,100	1,800	1,200 J	890	1,000	3,000	1,900	2,800	1,400	1,800	2,800
Mercury	(Hg)	1.8	0.86	0.18	0.15	0.11 U	0.85	0.21	0.27	0.11 U	0.17	0.11 U	0.11 U	0.11 U	0.54	0.76
Nickel	(Ni)	12	21	17	8.9	11	14	13	12	14	14	21	12	13	13	12
Potassium	(K)	1,700	1,300	2,100	1,600	1,400	1,800	2,400	1,700	1,400	1,700	1,700	2,100	1,400	2,100	2,200
Selenium	(Se)	1.6	2.8 U	2.8 U	0.87	1.5	1.8	1.8	1.1 U	1.4	27	2.1	1.7 U	1.6	2.2	3.2
Silver	(Ag)	3.2 J	16 J	6.2	3.4	1.1 UJ	7.6 J	3	2.2	2 J	83	4 J	1.1 J	2.3 J	2.5 J	8
Sodium	(Na)	120 U	110 U	110 U	110 U	110 U	120 U	110 U	110 U	110 U	110 U	110 U	110 U	110 U	120 U	190
Thallium	(Tl)	2.3 U	5.6 U	5.6 U	1.1 U	1.1 U	2.3 U	2.3 U	2.2 U	2.3 U	11 U	2.3 U	3.3 U	2.2 U	2.5 U	4.1 U
Vanadium	(V)	24	23	32	16	20	27	27	24	25	21	27	25	22	26	22
Zinc	(Zn)	1,200	5,800	4,800 J	410	390	1,000	960 J	970 J	1,500	12,000	5,700	780	1,300	880	2,700
Cyanide	(CN)	0.58 U	0.56 U	0.56	0.56 U	0.54 U	0.99	0.57 U	0.55 U	0.57 U	0.55 U	0.57 U	0.67	0.54 U	0.73	1.5

J The associated numerical value is an estimated quantity because quality control criteria were not met. Presence of the element is reliable.
U The analyte was not detected at or above the reported amount. The reported amount is the detection limit.
UJ The reported amount is estimated because quality control criteria were not met. The analyte was not detected.

TABLE 11
Soil Sampling XRF Results
Concentrations in mg/kg (ppm)

Sample ID	Antimony	Arsenic	Cadmium	Chromium HI	Chromium LO	Cobalt	Copper	Iron	Lead	Mercury	Molybdenum	Selenium	Silver	Thallium	Zinc
RAARCA1D1	57 U	170 U	210 U	710 J	350 U	1300 U	1200	55000	1700	110 U	8.5 U	57 U	130 U	18 J	2200
RAARCA1S1	72 J	77 U	210 U	770 J	350 U	1300 U	170 U	42000	700	110 U	8.6 J	57 U	130 U	11 U	1200
RAARCA1S2	57 U	77 U	210 U	640 J	350 U	1300 U	200 J	34000	570	110 U	8.5 U	57 U	130 U	11 U	850
RAARCR1D1	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	19000	82 U	110 U	8.5 U	57 U	130 U	22 J	170 U
RAARCR1D2	57 U	140 U	210 U	440 U	350 U	1300 U	170 U	40000	1400	110 U	8.5 U	57 U	130 U	11 U	2000
RAARCR1S1	57 U	77 U	210 U	440 U	360 J	1300 U	170 U	36000	760	110 U	8.5 U	57 U	130 U	13 J	1200
RAARCR1S2	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	36000	640	110 U	8.5 U	57 U	130 U	16 J	1000
RAARCR1S3	57 U	77 U	210 U	620 J	350 U	1300 U	170 U	36000	670	110 U	8.5 U	57 U	130 U	21 J	1000
RAARHA1D1	71 J	79 U	210 U	450 J	350 U	1300 U	170 U	28000	790	110 U	8.5 U	57 U	130 U	11 U	1400
RAARHA1S1	57 U	83 U	210 U	670 J	350 U	1300 U	170 U	29000	830	110 U	8.5 U	57 U	130 U	11 U	1700
RAARHA1S2	72 J	77 U	210 U	440 U	350 U	1300 U	170 U	23000	180 J	110 U	8.5 U	57 U	130 U	16 J	330 J
RAARSC1D1	58 J	77 U	210 U	440 U	350 U	1300 U	170 U	28000	510	110 U	8.5 U	57 U	130 U	11 U	1700
RAARSC1S1	130 J	92 U	210 U	440 U	350 U	1300 U	230 J	40000	920	110 U	8.5 U	57 U	130 U	11 U	1900
RAARSC1S2	73 J	77 U	210 U	820 J	350 U	1300 U	170 U	29000	510	110 U	8.5 U	57 U	130 U	29 J	2000
RAARTO1D1	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	29000	280	110 U	8.5 U	57 U	130 U	12 J	610
RAARTO1S1	78 J	77 U	210 U	440 U	350 U	1300 U	170 U	27000	390	110 U	8.5 U	57 U	130 U	22 J	780
RAARTO1S2	57 U	97 U	210 U	440 U	350 U	1300 U	190 J	35000	970	110 U	8.5 U	57 U	130 U	25 J	1900
RAARTP1D1	57 U	150 U	210 U	1200 J	350 U	1300 U	280 J	41000	1500	110 U	9.6 J	57 U	130 U	11 U	1600
RAARTP1S1	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	28000	570	110 U	8.5 U	57 U	130 U	20 J	1500
RAARTP1S2	57 U	82 U	210 U	440 U	350 U	1300 U	170 U	30000	820	110 U	8.5 U	57 U	130 U	26 J	1800
RAARTP1S3	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	19000	82 U	110 U	8.5 U	57 U	130 U	15 J	170 U
RAARTP1S4	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	15000	82 U	110 U	8.5 U	57 U	130 U	11 U	170 U
RAARWI1D1	57 U	280 U	210 U	440 U	350 U	1300 U	170 U	28000	2700	110 U	8.5 U	57 U	130 U	18 J	1400
RAARWI1S1	70 J	120 U	210 U	460 J	350 U	1300 U	170 U	35000	1200	110 U	8.5 U	57 U	130 U	33 J	1700
RAARWI1S2	57 U	410 U	210 U	830 J	350 U	1300 U	220 J	31000	4100	110 U	8.5 U	57 U	130 U	11 U	980
RACASC1D1	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	29000	370	110 U	8.5 U	57 U	130 U	15 J	1400
RACASC1S1	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	32000	770	110 U	8.5 U	57 U	130 U	13 J	2000
RACASC1S2	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	28000	610	110 U	8.5 U	57 U	130 U	18 J	1600
RACASC3D1	62 J	77 U	210 U	440 U	350 U	1300 U	170 U	31000	490	110 U	8.5 U	57 U	130 U	14 J	1800
RACASC3S1	75 J	77 U	210 U	440 U	350 U	1300 U	170 U	26000	710	110 U	8.5 U	57 U	130 U	32 J	1800
RACASC3S2	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	30000	490	110 U	8.5 U	57 U	130 U	30 J	1800
RACASC3S3	57 U	77 U	210 U	750 J	350 U	1300 U	170 U	24000	82 U	110 U	8.5 U	57 U	130 U	11 U	170 U
RACOAD1D1	54 U	100 U	150 U	940 U	470 U	870 U	110 U	45000	1000	97 U	11 U	16 U	84 U	14 U	1300
RACOAD1S1	54 U	79 U	150 U	940 U	470 U	870 U	110 U	28000	790	97 U	11 U	16 U	84 U	26 J	1400
RACOAD1S2	61 J	100 U	150 U	940 U	470 U	870 U	110 U	32000	1000	97 U	11 U	16 U	84 U	14 U	1200
RACOCA1D1	54 U	61 U	150 U	940 U	470 U	870 U	110 U	31000	550	97 U	11 U	16 U	84 U	17 J	920

TABLE 11
Soil Sampling XRF Results
Concentrations in mg/kg (ppm)
(continued)

Sample ID	Antimony	Arsenic	Cadmium	Chromium HI	Chromium LO	Cobalt	Copper	Iron	Lead	Mercury	Molybdenum	Selenium	Silver	Thallium	Zinc
RACOCA1S1	43 J	74 U	190 U	580 U	340 U	610 J	90 U	34000	740	73 U	11 U	25 U	120 U	35	1200
RACOCA1S2	31 J	58 U	190 U	580 U	340 U	460 J	90 U	29000	580	73 U	11 U	25 U	120 U	22 J	1500
RACOCA2D1	58 J	150 U	150 U	940 U	470 U	870 U	130 J	29000	1500	97 U	11 U	16 U	84 U	20 J	2200
RACOCA2S1	62 J	61 U	150 U	940 U	470 U	870 U	110 U	32000	550	97 U	11 U	16 U	84 U	19 J	2400
RACOCA2S2	54 U	85 U	150 U	940 U	470 U	870 U	110 U	31000	850	97 U	11 U	16 U	84 U	17 J	1800
RACOCI1D1	54 U	61 U	150 U	940 U	470 U	870 U	110 U	35000	450	97 U	11 U	16 U	84 U	16 J	1300
RACOCI1S1	54 U	85 U	150 U	940 U	470 U	870 U	110 U	38000	850	97 U	11 U	16 U	84 U	26 J	2500
RACOCI1S2	59 J	89 J	150 U	940 U	470 U	870 U	110 U	42000	790	97 U	11 U	16 U	84 U	14 U	1800
RACOCL1D1	71 J	53 J	190 U	580 U	340 U	320 U	90 U	30000	500	73 U	11 U	25 U	120 U	16 J	1600
RACOCL1S1	44 J	33 U	190 U	580 U	340 U	320 U	90 U	35000	330	73 U	11 U	25 U	120 U	20 J	1300
RACOCL1S2	37 J	20 U	190 U	580 U	340 U	320 U	90 U	19000	130	73 U	11 U	25 U	120 U	16 J	260
RACOJN1D1	29 U	21 J	190 U	580 U	340 U	470 J	90 U	28000	180	73 U	11 U	25 U	120 U	9.8 U	2000
RACOJN1S1	29 U	32 J	190 U	580 U	340 U	370 J	90 U	24000	210	73 U	11 U	25 U	120 U	11 J	1200
RACOJN1S2	57 J	58 J	190 U	640 J	340 U	320 U	90 U	31000	520	73 U	11 U	25 U	120 U	21 J	980
RACOJN1S3	31 J	44 J	190 U	580 U	340 U	320 U	90 U	29000	340	73 U	11 U	25 U	120 U	32 J	970
RACOSH1D1	47 J	51 U	190 U	580 U	340 U	490 J	90 U	27000	510	73 U	11 U	25 U	120 U	16 J	1100
RACOSH1S1	54 U	61 U	150 U	940 U	470 U	870 U	110 U	30000	560	97 U	11 U	16 U	84 U	14 U	1300
RACOSH1S2	54 U	61 U	150 U	940 U	470 U	870 U	110 U	27000	490	97 U	11 U	16 U	84 U	14 U	950
RACOWH1D1	43 J	51 J	190 U	580 U	340 U	470 J	90 U	31000	240	73 U	11 U	25 U	120 U	22 J	1400
RACOWH1S1	29 U	35 U	190 U	580 U	340 U	370 J	90 U	29000	360	73 U	11 U	25 U	120 U	14 J	710
RACOWH1S2	29 U	82 U	190 U	580 U	340 U	320 U	90 U	38000	820	73 U	11 U	25 U	120 U	21 J	2200
RAEDSF1S1	91 J	110	190 U	580 U	340 U	590 J	90 U	48000	120 J	73 U	11 U	25 U	120 U	12 J	570
RAEDSF1S2	81 J	30 U	190 U	580 U	340 U	620 J	90 U	43000	300	73 U	11 U	25 U	120 U	14 J	540
RAEDSF1S3	48 J	73 U	190 U	580 U	340 U	1200	160 J	69000	730	73 U	11 U	25 U	120 U	23 J	530
RAGACA1D1	64 J	96 U	190 U	580 U	340 U	420 J	170 J	37000	960	73 U	11 U	25 U	120 U	13 J	2900
RAGACA1D2	68 J	61 U	150 U	940 U	470 U	870 U	340 J	16000	43 U	97 U	11 U	16 U	84 U	14 U	4000
RAGACA1S1	31 J	220 U	190 U	580 U	340 U	810 J	260 J	53000	2200	73 U	11 U	25 U	120 U	9.8 U	3000
RAGACA1S2	41 J	52 J	190 U	580 U	340 U	540 J	380	25000	390	73 U	11 U	25 U	120 U	9.8 U	3600
RAGACN1D1	57 J	100 U	150 U	940 U	470 U	870 U	210 J	31000	1000	97 U	11 U	16 U	84 U	16 J	5400
RAGACN1S1	54 U	130 U	150 U	940 U	470 U	870 U	170 J	36000	1300	97 U	11 U	16 U	84 U	23 J	6000
RAGACN1S2	54 U	130 U	150 U	940 U	470 U	870 U	210 J	34000	1300	97 U	11 U	16 U	84 U	16 J	5000
RAGADO1D1	54 U	260 U	150 U	940 U	470 U	870 U	150 J	51000	2600	97 U	11 U	16 U	84 U	25 J	3800
RAGADO1S1	54 U	120 U	150 U	940 U	470 U	870 U	110 U	34000	1200	97 U	11 U	16 U	84 U	16 J	2000
RAGADO1S2	54 U	230 U	150 U	940 U	470 U	870 U	240 J	46000	2300	97 U	11 U	16 U	84 U	14 U	3300
RAGAEN1D1	54 U	150 U	150 U	940 U	470 U	870 U	110 U	34000	1400	97 U	11 U	16 U	84 U	40 J	3400
RAGAEN1S1	54 U	85 U	150 U	940 U	470 U	870 U	150 J	30000	850	97 U	11 U	16 U	84 U	14 U	3500

TABLE 11
Soil Sampling XRF Results
Concentrations in mg/kg (ppm)
(continued)

Sample ID	Antimony	Arsenic	Cadmium	Chromium HI	Chromium LO	Cobalt	Copper	Iron	Lead	Mercury	Molybdenum	Selenium	Silver	Thallium	Zinc
RAGAEN1S2	54 U	190 U	150 U	940 U	470 U	870 U	190 J	42000	1900	97 U	11 U	16 U	84 U	16 J	3900
RAGAGA1D1	59 J	77 U	210 U	440 U	350 U	1300 U	170 U	31000	530	110 U	8.5 U	57 U	130 U	14 J	1500
RAGAGA1S1	57 U	77 U	210 U	530 J	350 U	1300 U	170 U	30000	630	110 U	8.5 U	57 U	130 U	11 U	2600
RAGAGA1S2	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	24000	300	110 U	8.5 U	57 U	130 U	23 J	970
RAGAHO1D1	54 U	61 U	150 U	940 U	470 U	870 U	110 U	30000	500	97 U	11 U	16 U	84 U	20 J	1000
RAGAHO1S1	54 U	61 U	150 U	940 U	470 U	870 U	110 U	19000	170	97 U	11 U	16 U	84 U	14 U	420
RAGAHO1S2	78 J	61 U	150 U	940 U	470 U	870 U	110 U	21000	230	97 U	11 U	16 U	84 U	14 U	450
RAGAHO1S3	54 U	150 U	150 U	940 U	470 U	870 U	110 U	28000	1500	97 U	11 U	16 U	84 U	14 U	2200
RAGAKZ1D1	54 U	69 J	150 U	940 U	470 U	870 U	110 U	27000	520	97 U	11 U	16 U	84 U	14 U	1400
RAGAKZ1S1	54 U	67 U	150 U	940 U	470 U	870 U	110 U	27000	670	97 U	11 U	16 U	84 U	14 U	1400
RAGAKZ1S2	54 U	110 U	150 U	940 U	470 U	870 U	110 J	32000	1100	97 U	11 U	16 U	84 U	14 U	2400
RAGAKZ1S3	54 U	70 U	150 U	940 U	470 U	870 U	110 U	26000	700	97 U	11 U	16 U	84 U	14 U	1500
RAGLLA1D1	54 U	61 U	150 U	940 U	470 U	870 U	110 U	31000	240	97 U	15 J	16 U	84 U	15 J	610
RAGLLA1S1	54 U	310 U	150 U	940 U	470 U	870 U	110 U	42000	3100	97 U	11 U	16 U	84 U	20 J	5700
RAGLLA1S2	54 U	110 U	150 U	940 U	470 U	870 U	110 U	39000	1100	97 U	11 U	16 U	84 U	14 U	1600
RAGLLA1S3	54 U	61 U	150 U	940 U	470 U	870 U	110 U	19000	110 J	97 U	11 U	16 U	84 U	14 U	340
RAGLLA1S4	54 U	76 U	150 U	940 U	470 U	870 U	110 U	25000	760	97 U	11 U	16 U	84 U	14 U	1300
RAHALI1D1	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	11000 J	82 U	110 U	8.5 U	57 U	130 U	19 J	170 U
RAHALI1S1	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	18000	230 J	110 U	8.5 U	57 U	130 U	11 U	310 J
RAHALI1S2	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	28000	620	110 U	8.5 U	57 U	130 U	11 U	960
RAHARB01	45 J	460 U	190 U	810 J	340 U	440 J	380	61000	4600	73 U	11 U	25 U	120 U	27 J	11000
RAHARB02	38 J	160 U	190 U	680 J	340 U	1400	90 U	64000	1600	73 U	11 U	25 U	120 U	9.8 U	860
RAHARB03	340	6500 U	190 U	2600	340 U	770 J	1700	51000	65000	230 J	13 J	25 U	120 U	88	22000
RAHARB04	59 J	430 U	190 U	580 U	340 U	750 J	440	67000	4300	73 U	11 U	25 U	120 U	19 J	9200
RAHARB05	64 J	850 U	190 U	580 U	340 U	730 J	550	55000	8500	73 U	11 U	25 U	120 U	20 J	6100
RAHARB06	36 J	240 U	190 U	970 J	340 U	1100 J	180 J	83000	2400	73 U	11 U	25 U	120 U	9.8 U	1200
RAHARB07	29 U	160 U	190 U	580 U	340 U	360 J	90 U	41000	1600	73 U	11 U	25 U	120 U	12 J	1700
RAHARB08	52 J	310 U	190 U	580 U	340 U	750 J	470	102224	3100	73 U	19 J	25 U	120 U	9.8 U	1700
RAHARB09	55 J	290 U	190 U	580 U	340 U	320 U	90 U	35000	2900	73 U	11 U	25 U	120 U	16 J	1400
RAHARE1D1	57 U	360 U	210 U	470 J	350 U	1300 U	210 J	33000	3600	110 U	11 J	57 U	130 U	24 J	2300
RAHARE1S1	57 U	240 U	210 U	440 U	350 U	1300 U	170 U	35000	2400	110 U	8.5 U	57 U	130 U	18 J	2100
RAHARE1S3	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	9600 J	82 U	110 U	8.5 U	57 U	130 U	16 J	170 U
RAHARO1D1	65 J	290 U	210 U	700 J	350 U	1300 U	410 J	41000	2900	110 U	11 J	57 U	130 U	11 U	3400
RAHARO1S1	97 J	500 U	210 U	1300 J	350 U	1300 U	410 J	51000	5000	110 U	8.5 U	57 U	130 U	11 U	3500
RAHARO1S2	57 U	240 U	210 U	550 J	350 U	1300 U	320 J	40000	2400	110 U	8.5 U	57 U	130 U	13 J	2500
RAHICN1D1	54 U	87 U	150 U	940 U	470 U	870 U	110 U	33000	870	97 U	11 U	16 U	84 U	15 J	3300

TABLE 11
Soil Sampling XRF Results
Concentrations in mg/kg (ppm)
(continued)

Sample ID	Antimony	Arsenic	Cadmium	Chromium HI	Chromium LO	Cobalt	Copper	Iron	Lead	Mercury	Molybdenum	Selenium	Silver	Thallium	Zinc
RAHICN1S1	54 U	130 U	150 U	940 U	470 U	870 U	140 J	37000	1300	97 U	11 U	16 U	84 U	18 J	3100
RAHICN1S2	54 U	150 U	150 U	940 U	470 U	870 U	110 U	39000	1500	97 U	11 U	16 U	84 U	22 J	2900
RAHYFS1D1	41 J	27 J	190 U	580 U	340 U	320 U	90 U	25000	43 J	73 U	11 U	25 U	120 U	11 J	1900
RAHYFS1S1	39 J	36 J	190 U	580 U	340 U	320 U	90 U	26000	85 J	73 U	11 U	25 U	120 U	13 J	310
RAHYFS1S2	65 J	25 J	190 U	580 U	340 U	320 U	90 U	27000	47 J	73 U	11 U	25 U	120 U	19 J	270
RAKICA1D1	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	36000	220 J	110 U	9.2 J	57 U	130 U	11 U	2200
RAKICA1S1	57 U	77 U	210 U	530 J	350 U	1300 U	170 U	27000	300	110 U	8.5 U	57 U	130 U	17 J	770
RAKICA1S2	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	37000	450	110 U	15 J	57 U	130 U	22 J	1700
RAMAHE1D1	33 J	52 U	190 U	580 U	340 U	620 J	90 U	33000	520	73 U	11 U	25 U	120 U	10 J	840
RAMAHE1S1	54 U	71 U	150 U	940 U	470 U	870 U	110 U	33000	710	97 U	11 U	16 U	84 U	17 J	1100
RAMAHE1S2	30 J	110 U	190 U	580 U	340 U	520 J	90 U	37000	1000	73 U	11 U	25 U	120 U	10 J	1200
RAMIWL1D1	41 J	24 U	190 U	580 U	340 U	320 J	90 U	22000	240	73 U	11 U	25 U	120 U	18 J	950
RAMIWL1S1	42 J	20 U	190 U	580 U	340 U	320 U	90 U	18000	38 U	73 U	11 U	25 U	120 U	19 J	140 J
RAMIWL1S2	42 J	46 U	190 U	580 U	340 U	370 J	90 U	24000	460	73 U	11 U	25 U	120 U	9.8 U	1100
RAPIME1D1	30 J	20 U	190 U	580 U	340 U	320 U	90 U	25000	89 J	73 U	11 U	25 U	120 U	9.8 U	480
RAPIME1S1	29 U	26 J	190 U	580 U	340 U	380 J	90 U	25000	63 J	73 U	11 U	25 U	120 U	17 J	370
RAPIME1S2	72 J	20 U	190 U	580 U	340 U	530 J	90 U	22000	150	73 U	11 U	25 U	120 U	20 J	360
RAPKMI1D1	49 J	33 J	190 U	630 J	340 U	380 J	90 U	47000	38 U	73 U	11 U	25 U	120 U	19 J	260
RAPKMI1S1	65 J	71	190 U	580 U	340 U	320 U	90 U	50000	170	73 U	11 U	25 U	120 U	15 J	370
RAPKMI1S2	76 J	99	190 U	580 U	340 U	350 J	180 J	50000	600	73 U	11 U	25 U	120 U	13 J	660
RAPKWT1D1	29 U	33 J	190 U	580 U	340 U	320 U	90 U	46000	160	73 U	11 U	25 U	120 U	25 J	560
RAPKWT1S1	37 J	59 J	190 U	580 U	340 U	480 J	90 U	51000	160	73 U	11 U	25 U	120 U	18 J	420
RAPKWT1S2	29 U	77	190 U	580 U	340 U	830 J	90 U	50000	400	73 U	11 U	25 U	120 U	20 J	530
RARIFE1D1	57 U	77 U	210 U	460 J	350 U	1300 U	170 U	24000	200 J	110 U	8.5 U	57 U	130 U	11 U	430 J
RARIFE1S1	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	26000	330	110 U	8.5 U	57 U	130 U	11 U	530 J
RARIFE1S2	71 J	77 U	210 U	440 U	350 U	1300 U	170 U	26000	260 J	110 U	8.5 U	57 U	130 U	11 U	450 J
RARIFE1S3	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	27000	340	110 U	8.9 J	57 U	130 U	20 J	870
RARIGS1D1	29 U	61 U	190 U	580 U	340 U	320 U	90 U	25000	610	73 U	11 U	25 U	120 U	20 J	1400
RARIGS1S1	53 J	130 U	190 U	580 U	340 U	1100	90 U	81000	1300	73 U	11 U	25 U	120 U	12 J	3000
RARIGS1S2	38 J	130 U	190 U	580 U	340 U	550 J	90 U	31000	1300	73 U	11 U	25 U	120 U	30 J	3000
RARIGS1S3	83 J	84 U	190 U	780 J	340 U	370 J	90 U	27000	850	73 U	11 U	25 U	120 U	13 J	1200
RARILE1D1	57 U	82 U	210 U	570 J	350 U	1300 U	170 U	31000	820	110 U	8.5 U	57 U	130 U	15 J	1200
RARILE1S1	57 U	100 U	210 U	520 J	350 U	1300 U	170 U	30000	1000	110 U	8.5 U	57 U	130 U	11 U	1200
RARILE1S2	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	30000	570	110 U	8.5 U	57 U	130 U	21 J	1100
RARILE1S3	62 J	77 U	210 U	440 J	350 U	1300 U	170 U	16000	150 J	110 U	8.5 U	57 U	130 U	11 U	390 J
RASDGR1D1	29 U	20 U	190 U	580 U	340 U	320 U	90 U	14000	38 U	73 U	11 U	25 U	120 U	11 J	99 J

TABLE 11
Soil Sampling XRF Results
Concentrations in mg/kg (ppm)
(continued)

Sample ID	Antimony	Arsenic	Cadmium	Chromium HI	Chromium LO	Cobalt	Copper	Iron	Lead	Mercury	Molybdenum	Selenium	Silver	Thallium	Zinc
RASDGR1S1	29 U	20 U	190 U	580 U	340 U	320 U	90 U	24000	38 U	73 U	11 U	25 U	120 U	9.8 U	150 J
RASDGR1S2	55 J	22 J	190 U	580 U	340 U	500 J	90 U	27000	44 J	73 U	11 U	25 U	120 U	9.8 U	250
RASDGR1S3	31 J	20 U	190 U	580 U	340 U	320 U	90 U	28000	38 U	73 U	11 U	25 U	120 U	19 J	130 J
RASDGR1S4	40 J	21 J	190 U	580 U	340 U	320 U	90 U	32000	38 U	73 U	11 U	25 U	120 U	21 J	210 J
RASHBE1D1	54 U	61 U	150 U	940 U	470 U	870 U	110 U	25000	450	97 U	11 U	16 U	84 U	19 J	930
RASHBE1S1	54 U	130 U	150 U	940 U	470 U	870 U	110 U	42000	1300	97 U	11 U	16 U	84 U	21 J	1700
RASHBE1S2	62 J	140 U	150 U	940 U	470 U	870 U	110 J	38000	1400	97 U	11 U	16 U	84 U	28 J	2600
RASHCO1D1	68 J	120 U	150 U	940 U	470 U	870 U	120 J	39000	1200	97 U	11 U	16 U	84 U	28 J	3900
RASHCO1S1	54 U	220 U	150 U	940 U	470 U	870 U	120 J	42000	2200	97 U	11 U	16 U	84 U	23 J	4500
RASHCO1S2	54 U	200 U	150 U	940 U	470 U	950 J	110 U	35000	2000	97 U	11 U	16 U	84 U	25 J	3500
RASHDA1D1	54 U	61 U	150 U	940 U	470 U	870 U	110 U	35000	460	97 U	11 U	16 U	84 U	14 U	910
RASHDA1S1	54 U	110 U	150 U	940 U	470 U	870 U	140 J	49000	1100	97 U	16 J	16 U	84 U	18 J	1200
RASHDA1S2	61 J	170 U	150 U	940 U	470 U	870 U	110 U	37000	1700	97 U	11 U	16 U	84 U	14 U	3500
RASICU1D1	57 U	77 U	210 U	700 J	350 U	1300 U	170 U	25000	82 U	110 U	8.5 U	57 U	130 U	11 U	310 J
RASICU1S1	69 J	77 U	210 U	440 U	350 U	1300 U	170 U	31000	330	110 U	8.5 U	57 U	130 U	14 J	380 J
RASICU1S2	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	27000	82 U	110 U	8.5 U	57 U	130 U	11 U	310 J
RASIKI1D1	66 J	77 U	210 U	440 U	350 U	1300 U	170 U	29000	82 U	110 U	8.5 U	57 U	130 U	11 U	210 J
RASIKI1S1	57 U	77 U	210 U	860 J	350 U	1300 U	170 U	35000	210 J	110 U	12 J	57 U	130 U	11 U	340 J
RASIKI1S2	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	36000	170 J	110 U	8.5 U	57 U	130 U	17 J	300 J
RASIST1D1	57 U	77 U	210 U	570 J	350 U	1300 U	170 U	30000	86 J	110 U	12 J	57 U	130 U	30 J	270 J
RASIST1S1	70 J	77 U	210 U	440 U	350 U	1300 U	170 U	28000	260 J	110 U	8.5 U	57 U	130 U	11 U	500 J
RASIST2S1	57 U	77 U	210 U	680 J	350 U	1300 U	170 U	29000	230 J	110 U	8.5 U	57 U	130 U	13 J	420 J
RASIST3S1	57 U	77 U	210 U	440 U	350 U	1300 U	170 U	28000	82 U	110 U	8.5 U	57 U	130 U	17 J	220 J
RASOBO1D1	54 U	180 U	150 U	940 U	470 U	870 U	110 U	35000	1800	97 U	11 U	16 U	84 U	20 J	2100
RASOBO1S1	54 U	61 U	150 U	940 U	470 U	870 U	110 U	21000	550	97 U	11 U	16 U	84 U	37 J	800
RASOBO1S2	54 U	130 U	150 U	940 U	470 U	870 U	110 U	33000	1200	97 U	11 U	16 U	84 U	15 J	1800
RASOHE1D1	54 U	920 U	150 U	1100 J	470 U	870 U	270 J	37000	9200	97 U	11 U	16 U	84 U	20 J	18000
RASOHE1S1	54 U	61 U	150 U	940 U	470 U	870 U	110 U	20000	300	97 U	11 U	16 U	84 U	17 J	560
RASOHE1S2	99 J	1800 U	150 U	940 U	470 U	870 U	220 J	45000	18000	97 U	11 U	16 U	84 U	39 J	13000
RASOHE1S3	62 J	230 U	150 U	940 U	470 U	870 U	130 J	36000	2300	97 U	11 U	16 U	84 U	22 J	3300
RASOIR1D1	54 U	73 J	150 U	940 U	470 U	870 U	110 U	30000	520	97 U	11 U	16 U	84 U	31 J	800
RASOIR1S1	54 U	68 U	150 U	940 U	470 U	870 U	110 U	26000	680	97 U	11 U	16 U	84 U	27 J	1000
RASOIR1S2	54 J	89 J	150 U	940 U	470 U	870 U	110 U	26000	670	97 U	11 U	16 U	84 U	21 J	880
RASVCN1D1	54 U	180 U	150 U	940 U	470 U	870 U	220 J	39000	1800	97 U	11 U	16 U	84 U	14 U	4800
RASVCN1S1	54 U	270 U	150 U	940 U	470 U	870 U	180 J	41000	2700	97 U	11 U	16 U	84 U	16 J	4400
RASVCN1S2	54 U	230 U	150 U	940 U	470 U	870 U	240 J	35000	2300	97 U	11 U	16 U	84 U	14 U	4700

TABLE 11
Soil Sampling XRF Results
Concentrations in mg/kg (ppm)
(continued)

Sample ID	Antimony	Arsenic	Cadmium	Chromium HI	Chromium LO	Cobalt	Copper	Iron	Lead	Mercury	Molybdenum	Selenium	Silver	Thallium	Zinc
RASVCN2D1	56 J	270 U	150 U	940 U	470 U	870 U	180 J	36000	2700	97 U	11 U	16 U	84 U	32 J	4500
RASVCN2S1	54 U	190 U	150 U	940 U	470 U	870 U	300 J	39000	1900	97 U	11 U	16 U	84 U	14 U	6700
RASVCN2S2	55 J	240 U	150 U	940 U	470 U	870 U	110 U	33000	2400	97 U	11 U	16 U	84 U	15 J	3500
RASVFO1D1	51 J	28 J	190 U	580 U	340 U	320 U	90 U	26000	150	73 U	11 U	25 U	120 U	9.8 U	860
RASVFO1S1	29 U	82 U	190 U	580 U	340 U	320 U	100 J	33000	820	73 U	11 U	25 U	120 U	31 J	2300
RASVFO1S2	78 J	36 U	190 U	580 U	340 U	320 U	90 U	29000	360	73 U	11 U	25 U	120 U	18 J	1100
RASVFO2D1	91 J	120 U	150 U	940 U	470 U	870 U	110 U	25000	1200	97 U	11 U	16 U	84 U	18 J	4800
RASVFO2S1	54 U	140 U	150 U	940 U	470 U	870 U	110 U	33000	1400	97 U	11 U	16 U	84 U	19 J	4100
RASVFO2S2	100 J	150 U	150 U	940 U	470 U	870 U	110 J	60000	1500	97 U	11 U	16 U	84 U	19 J	1800
RASVFO3D1	54 U	61 U	150 U	940 U	470 U	870 U	110 U	26000	460	97 U	11 U	16 U	84 U	20 J	3300
RASVFO3S1	68 J	87 U	150 U	940 U	470 U	870 U	110 U	29000	870	97 U	11 U	16 U	84 U	24 J	3100
RASVFO3S2	54 U	72 U	150 U	940 U	470 U	870 U	110 U	32000	720	97 U	11 U	16 U	84 U	20 J	3300
RASVKR1D1	51 J	37 J	190 U	600 J	340 U	320 U	190 J	31000	84 J	73 U	11 U	25 U	120 U	17 J	2900
RASVKR1S1	37 J	29 U	190 U	700 J	340 U	320 U	90 U	41000	290	73 U	11 U	25 U	120 U	9.8 U	2300
RASVKR1S2	29 U	20 U	190 U	650 J	340 U	370 J	90 U	30000	78 J	73 U	11 U	25 U	120 U	14 J	1600
RAYEMU1D1	54 U	150 U	150 U	940 U	470 U	870 U	110 U	37000	1500	97 U	11 U	16 U	84 U	25 J	3300
RAYEMU1S1	54 U	160 U	150 U	940 U	470 U	870 U	110 U	43000	1500	97 U	11 U	16 U	84 U	15 J	3000
RAYEMU1S2	54 U	140 U	150 U	940 U	470 U	870 U	110 U	37000	1400	97 U	11 U	16 U	84 U	28 J	2800

J The associated numerical value is an estimated quantity because quality control criteria were not met. Presence of the element is reliable.
U The analyte was not detected at or above the reported amount. The reported amount is the detection limit.

APPENDIX A

XRF Sample Preparation and Analysis

Site Specific XRF Sample Preparation

XRF sample preparation will follow the general guidelines set forth below:

- Each sample will be collected in a seal top poly bag, homogenized, labeled with the appropriate sample identification, and transported to the field laboratory work space for XRF analysis.
- A portion of the sample will be placed in a container for drying on a griddle, or in an oven at temperatures not to exceed 60°C, or by air drying. All containers will have identification tags containing a number that will be cross-referenced to the sample number. Both identifiers will be documented in the START2 XRF Sample Preparation Log.
- Once the samples are dry, they will be sieved using nylon lead-free sieves. A 60-mesh sieve (250 μm) will be used for grab surface samples. Samples placed on top of the screen will be shaken, swirled, tapped, and bumped until all the particles smaller than 60-mesh for the composited surface samples have fallen through the top sieve. The sample will not be ground or forced through the sieve. The discrete depth samples may be sieved with a 10-mesh screen.
- The collection tray will be emptied into an XRF sample cup. The drying and sieving of additional sample material may be repeated until the XRF sample cup is filled. The sample cup will be covered with 0.2-mil Mylar® or polypropylene film. The sample cup will be tapped on a table top to pack the sample against the window film.
- Sample will be analyzed as stated in the text of this document. Sample calibration, calibration checks, and samples analyzed will be documented in the START2 XRF Analysis Log.
- Non-dedicated sieves, collection trays, and any other implements used will be decontaminated between each sample.

If the sample was dry enough to flow through the mesh sieve easily, a dry decontamination will be used. The screen and pan will be wiped with paper towel and the screen brushed with a brass brush.

If the sample did not flow through the sieve easily, a wet decontamination will be used. The screen and pan will be washed with a Liquinox® solution, rinsed with potable water, and dried in an oven or with a hair dryer.

XRF ANALYSIS

All soil samples were analyzed with an XRF during field activities. The XRF field analytical data were evaluated as screening data according to the START Generic Quality Assurance Project Plan (QAPP) with an additional ten percent of these samples being analyzed by and independent laboratory for definitive confirmation analyses. All XRF data generated for this project were evaluated to ensure that instrument calibration, detection limits, energy calibration checks, blank checks, and field replicates were within operational control limits. The field XRF will be operated per the (Environmental Response Team (ERT) Standard Operating Procedure (SOP) 1713 and per the manufacturer's specifications (Environmental Response Team (ERT) 1995).

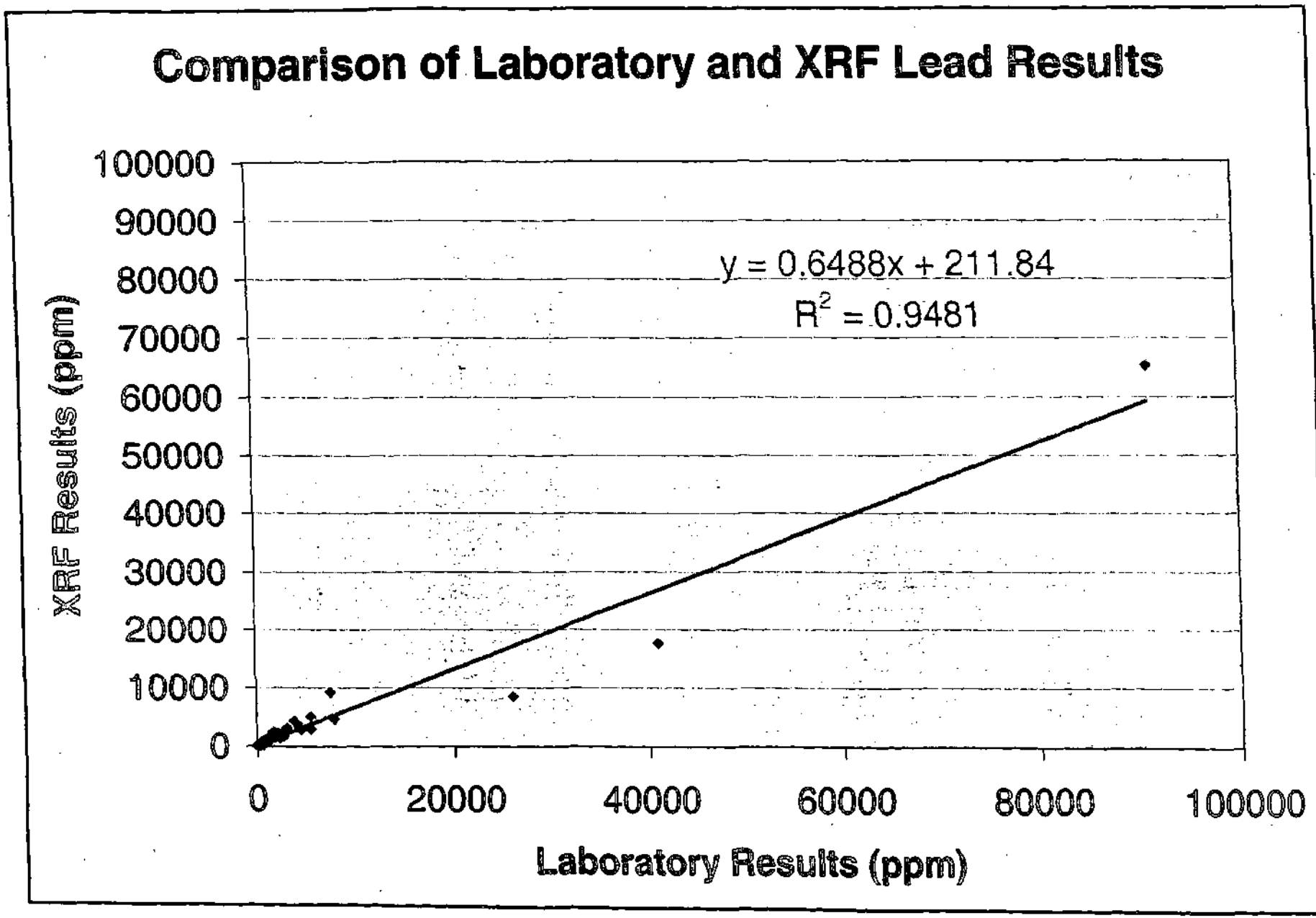
Prior to any analysis, an energy calibration and aquired background data were completed. Each day thereafter calibration checks were completed to ensure that the XRF was within operational guidelines. The samples were analyzed on a Spectrace 9000, serial number Q-024, with analysis times of 120 seconds for the source Cd-109, 30 seconds for the source Fe-55 and 30 seconds for the source Am-241. Because of high detection limits after the first run, the analysis times was modified to 210 seconds for the Cd-109 source.

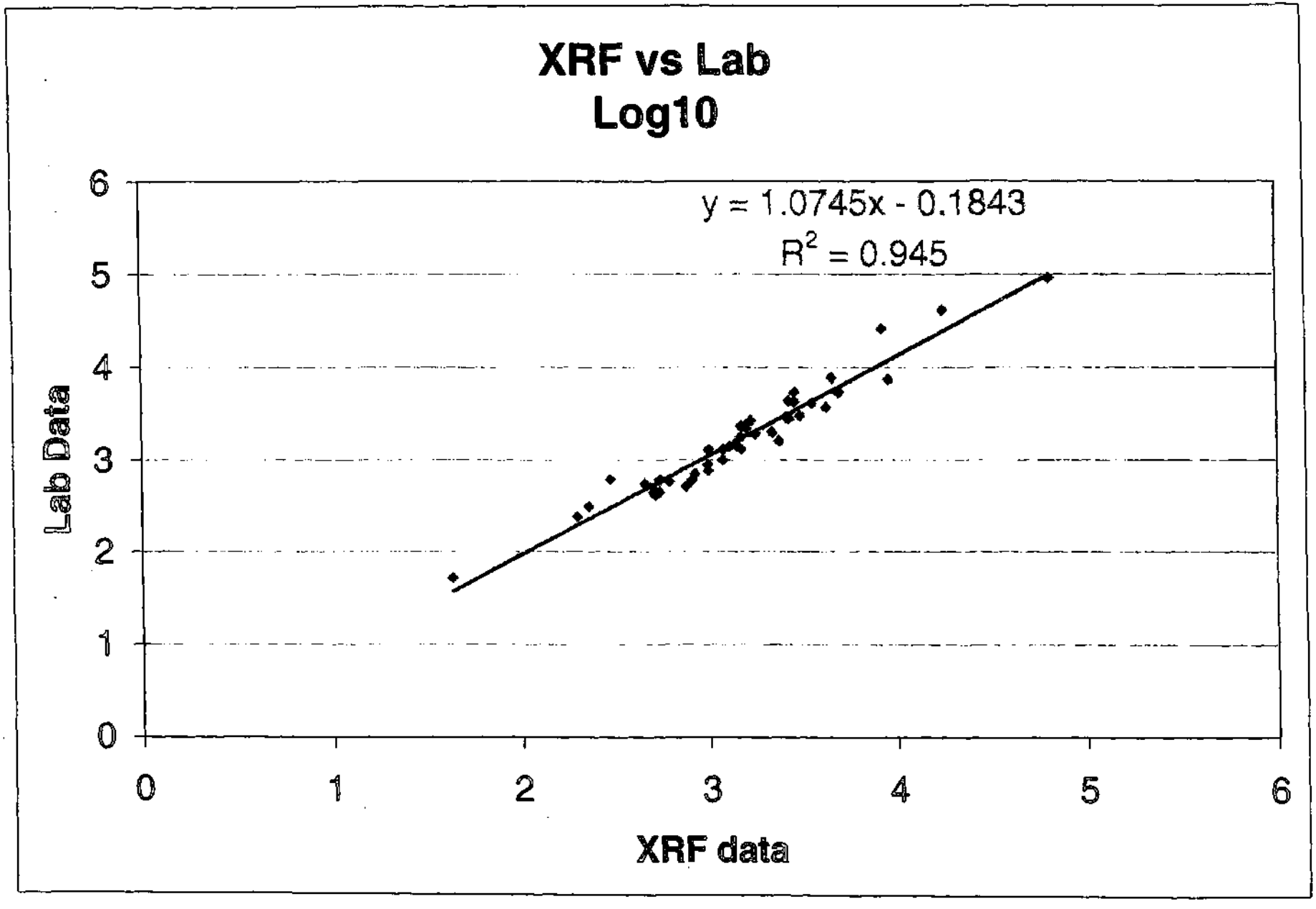
Detection limits calculated for the XRF instrument were established as a value three times the standard deviation of a low National Insitute of Standards and Technology (NIST) certified standard run (2709) a minimum of seven times over a specified period of time. In the case of arsenic, the detection limit is as stated above or one-tenth of the lead concentration for that sample, whichever is greater.

The laboratory versus XRF metal concentration data were compared using relative percent difference (RPD). Relative percent difference is the difference between the lab and XRF data divided by the average of the two values. This method shows less variability for the larger concentration data because the average (divisor) is higher and the result shows a lower RPD. At lower concentrations, a small variation between the values shows a larger RPD because the average is lower. This method for XRF data evaluation is more specific to whatever range of data is of most interest (usually the "action level"). RPD calculations for lead are reported in this Appendix. The RPD was not calculated for those results that were qualified as U. An RPD value of 35 percent or less suggests an acceptable concentration variance. The data was also compared by plotting the laboratory data versus the XRF data and calculating the R^2 value. This chart can also be found in this Appendix.

Relative Percent Difference Calculations
Lead Concentrations in mg/kg (ppm)

ID	XRF Lead	Lab Lead	RPD
RAHARB03	65312	91000	32.87%
RASOHE1S2	17647	41000	79.64%
RAHARB05	8530.2	26000	101.19%
RAHARB01	4554.7	7800	52.54%
RASOHE1D1	9196.1	7400	21.64%
RAHARB09	2923.5	5400	59.51%
RAHARO1S1	5023.2	5400	7.23%
RAARWI1D1	2746.8	4400	46.26%
RAHARO1D1	2921.8	4300	38.17%
RAHARE1D1	3570.2	4100	13.81%
RAHARB04	4264.3	3700	14.17%
RAHARB08	3117	3000	3.83%
RAGADO1D1	2560.4	2900	12.44%
RASVCN2D1	2679.2	2800	4.41%
RAARCA1D1	1696.7	2700	45.64%
RAHARB07	1637.5	2400	37.77%
RAARTP1D1	1491.1	2300	42.67%
RAHARB02	1637.3	2200	29.33%
RASHCO1S1	2162.1	2000	7.79%
RASOBO1D1	1795.6	1900	5.65%
RASVCN1D1	1839.7	1900	3.22%
RAYEMU1D1	1486.6	1800	19.07%
RAHARB06	2439.7	1600	41.57%
RAGAEN1D1	1449	1500	3.46%
RAGACN1S2	1297.2	1400	7.62%
RASVFO2S2	1541.2	1300	16.98%
RASHCO1D1	1206.5	1300	7.46%
RAGACN1D1	1005.6	1300	25.54%
RASVFO2D1	1150.9	1000	14.03%
RACOAD1D1	998.95	890	11.54%
RACOAD1S2	1012.4	760	28.48%
RARIGS1S3	844.73	700	18.74%
RAGAGA1S2	300.55	610	67.97%
RACOCA1D1	551.63	600	8.40%
RACOWH1S2	815.08	600	30.40%
RAHALI1S2	618.02	580	6.35%
RASHDA1D1	454.84	550	18.94%
RAGLLA1S4	760.63	510	39.45%
RASOIR1D1	515.6	450	13.59%
RASOBO1S1	550.23	440	22.26%
RAARSC1S2	507.88	440	14.32%
RACOJN1S2	523.45	410	24.31%
RAGAHO1S2	224.87	310	31.83%
RARIFE1D1	201.01 J	240	17.68%
RAPKMI1D1	38.07204196 U	99	NA
RAARCR1D1	82.03498219 U	59	NA
RAHYFS1D1	43.036 J	52	18.86%
RASDGR1D1	38.07204196 U	15	NA


Comparison of Laboratory and XRF Lead Results
y = 0.6488x + 211.84
R2 = 0.9481
XRF Results (ppm)
Laboratory Results (ppm)
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
0
20000
40000
60000
80000
100000


XRF vs Lab
Log10
y = 1.0745x - 0.1843
R2 = 0.945
Lab Data
XRF data
0
1
2
3
4
5
6

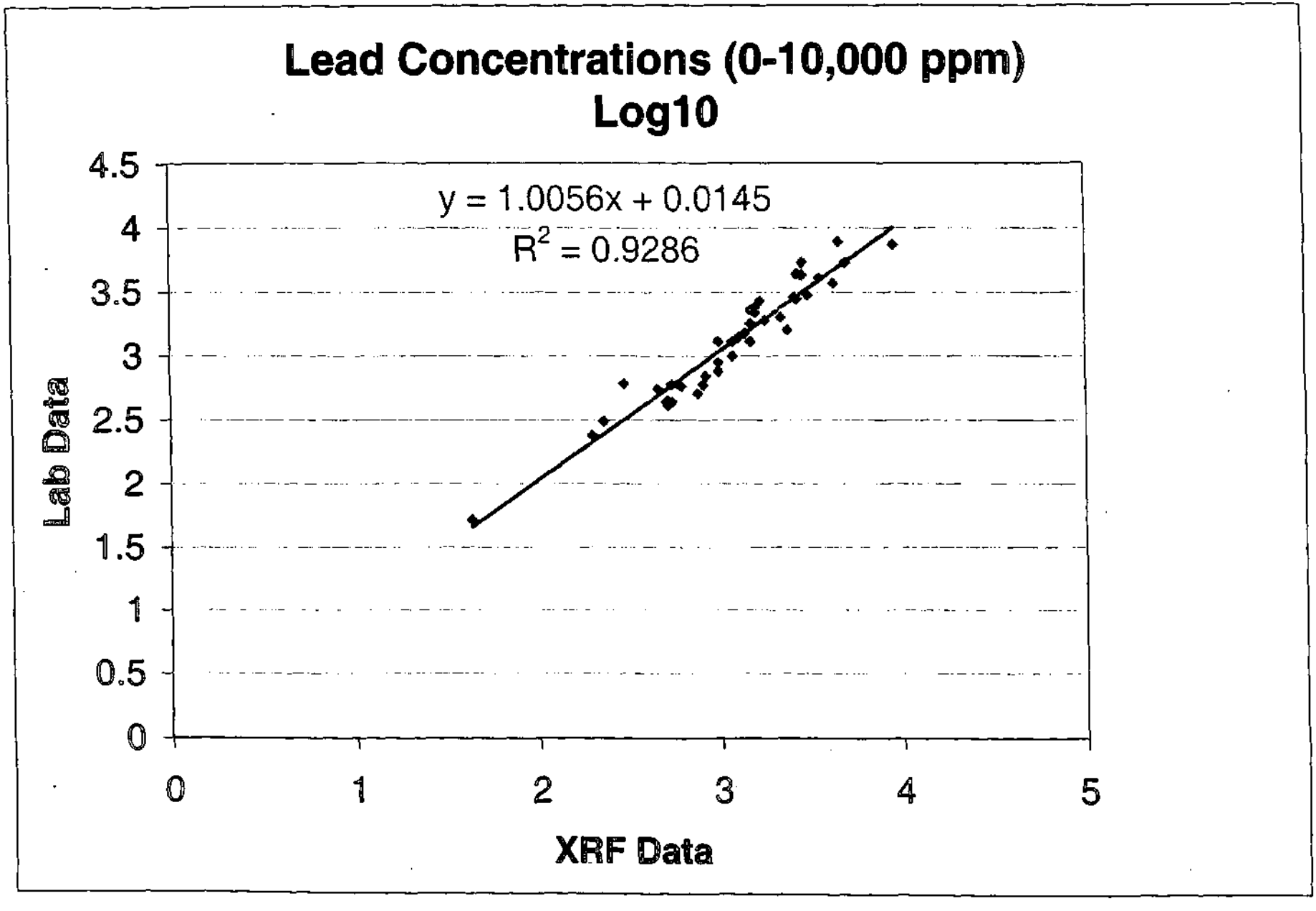

Lead Concentrations (0-10,000 ppm)
Log10
y = 1.0056x + 0.0145
R2 = 0.9286
Lab Data
XRF Data
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0
1
2
3
4
5

TABLE 1A

Rico Argentine

SPECTRACE 9000 XRF DATA (PPM)

ID	DATE	TIME	Sb	As	Ba	Cd	Ca	CrHI	CrLO	Co	Cu	Fe	Pb	Mn
RAARCA1D1	10/18/2003	1434	57 U	170 U	750	210 U	12000	710 J	350 U	1300 U	1200	55000	1700	4000
RAARCA1S1	10/18/2003	1445	72 J	77 U	790	210 U	10000	770 J	350 U	1300 U	170 U	42000	700	2000 J
RAARCA1S2	10/18/2003	1441	57 U	77 U	750	210 U	7800	640 J	350 U	1300 U	200 J	34000	570	1900 J
RAARCR1D1	10/18/2003	1457	57 U	77 U	1300	210 U	12000	440 U	350 U	1300 U	170 U	19000	82 U	1200 J
RAARCR1D2	10/18/2003	1453	57 U	140 U	830	210 U	7600	440 U	350 U	1300 U	170 U	40000	1400	2500
RAARCR1S1	10/18/2003	1508	57 U	77 U	840	210 U	10000	440 U	360 J	1300 U	170 U	36000	760	1600 J
RAARCR1S2	10/18/2003	1505	57 U	77 U	730	210 U	8100	440 U	350 U	1300 U	170 U	36000	640	2100
RAARCR1S3	10/18/2003	1501	57 U	77 U	710	210 U	7200	620 J	350 U	1300 U	170 U	36000	670	2300
RAARHA1D1	10/18/2003	1211	71 J	79 U	610	210 U	10000	450 J	350 U	1300 U	170 U	28000	790	1300 J
RAARHA1D1	10/18/2003	1207	57 U	77 U	130 U	210 U	1600 U	440 U	350 U	1300 U	170 U	3400 U	82 U	600 U
RAARHA1S1	10/18/2003	1219	57 U	83 U	710	210 U	12000	670 J	350 U	1300 U	170 U	29000	830	1500 J
RAARHA1S2	10/18/2003	1215	72 J	77 U	610	210 U	7600	440 U	350 U	1300 U	170 U	23000	180 J	940 J
RAARJO1D1	10/18/2003	1223	57 U	77 U	730	210 U	28000	440 U	350 U	1300 U	170 U	29000	280	800 J
RAARJO1S1	10/18/2003	1231	78 J	77 U	590	210 U	7500	440 U	350 U	1300 U	170 U	27000	390	1300 J
RAARJO1S2	10/18/2003	1227	57 U	97 U	760	210 U	15000	440 U	350 U	1300 U	190 J	35000	970	1600 J
RAARRI1S1	10/18/2003	1449	57 U	77 U	740	210 U	18000	440 U	350 U	1300 U	170 U	24000	200 J	900 J
RAARSC1D1	10/18/2003	1354	58 J	77 U	660	210 U	10000	440 U	350 U	1300 U	170 U	28000	510	1600 J
RAARSC1S1	10/18/2003	1413	130 J	92 U	740	210 U	14000	440 U	350 U	1300 U	230 J	40000	920	2100
RAARSC1S1B	10/18/2003	1408	57 U	77 U	130 U	210 U	1600 U	440 J	350 U	1300 U	170 U	3400 U	82 U	600 U
RAARSC1S2	10/18/2003	1404	73 J	77 U	770	210 U	9200	820 J	350 U	1300 U	170 U	29000	510	1400 J
RAARSC1S2D	10/18/2003	1358	57 U	77 U	750	210 U	10000	440 U	350 U	1300 U	170 U	30000	560	1400 J
RAARTP1D1	10/18/2003	1323	57 U	150 U	730	210 U	5400	1200 J	350 U	1300 U	280 J	41000	1500	2400
RAARTP1S1	10/18/2003	1350	57 U	77 U	610	210 U	9000	440 U	350 U	1300 U	170 U	28000	570	1600 J
RAARTP1S2	10/18/2003	1346	57 U	82 U	700	210 U	8300	440 U	350 U	1300 U	170 U	30000	820	1500 J
RAARTP1S3	10/18/2003	1342	57 U	77 U	1400	210 U	21000	440 U	350 U	1300 U	170 U	19000	82 U	800 J
RAARTP1S4	10/18/2003	1327	57 U	77 U	1200	210 U	17000	440 U	350 U	1300 U	170 U	15000	82 U	720 J
RAARWI1D1	10/18/2003	1146	57 U	280 U	530	210 U	6700	440 U	350 U	1300 U	170 U	28000	2700	1400 J
RAARWI1S1	10/18/2003	1203	70 J	120 U	810	210 U	11000	460 J	350 U	1300 U	170 U	35000	1200	1500 J
RAARWI1S2	10/18/2003	1159	57 U	410 U	660	210 U	6200	830 J	350 U	1300 U	220 J	31000	4100	640 J
RAARWI1S2D	10/18/2003	1151	57 U	490 U	630	210 U	6200	440 U	350 U	1300 U	170 U	33000	4900	1300 J
RACASC1D1	10/18/2003	1252	57 U	77 U	660	210 U	11000	440 U	350 U	1300 U	170 U	29000	370	1100 J
RACASC1S1	10/18/2003	1315	57 U	77 U	750	210 U	11000	440 U	350 U	1300 U	170 U	32000	770	1100 J
RACASC1S2	10/18/2003	1256	57 U	77 U	670	210 U	10000	440 U	350 U	1300 U	170 U	28000	610	1600 J
RACASC3D1	10/18/2003	1237	62 J	77 U	560	210 U	7200	440 U	350 U	1300 U	170 U	31000	490	2200
RACASC3S1	10/18/2003	1249	75 J	77 U	680	210 U	9700	440 U	350 U	1300 U	170 U	26000	710	1000 J

U - The analyte was not detected above the detection limit. The detection limit is reported.

J - The associated numerical value is an estimated quantity between the detection limit and the quantitation limit.

TABLE 1A

Rico Argentine

SPECTRACE 9000 XRF DATA (PPM)

ID	DATE	TIME	Sb	As	Ba	Cd	Ca	CrHI	CrLO	Co	Cu	Fe	Pb	Mn
RACASC3S2	10/18/2003	1244	57 U	77 U	640	210 U	8600	440 U	350 U	1300 U	170 U	30000	490	1500 J
RACASC3S3	10/18/2003	1240	57 U	77 U	730	210 U	26000	750 J	350 U	1300 U	170 U	24000	82 U	810 J
RACOAD1D1	10/22/2003	1104	54 U	100 U	740	150 U	8800	940 U	470 U	870 U	110 U	45000	1000	1500 J
RACOAD1S1	10/22/2003	1052	54 U	79 U	570	150 U	11000	940 U	470 U	870 U	110 U	28000	790	1200 J
RACOAD1S2	10/22/2003	1058	61 J	100 U	700	150 U	9400	940 U	470 U	870 U	110 U	32000	1000	1500 J
RACOCA1D1	10/22/2003	1007	54 U	61 U	620	150 U	8900	940 U	470 U	870 U	110 U	31000	550	1200 J
RACOCA1S1	10/21/2003	1647	43 J	74 U	690	190 U	11000	580 U	340 U	610 J	90 U	34000	740	880 J
RACOCA1S2	10/21/2003	1731	31 J	58 U	580	190 U	8400	580 U	340 U	460 J	90 U	29000	580	1700 J
RACOCA2D1	10/22/2003	1030	58 J	150 U	700	150 U	10000	940 U	470 U	870 U	130 J	29000	1500	790 J
RACOCA2S1	10/22/2003	1013	62 J	61 U	710	150 U	13000	940 U	470 U	870 U	110 U	32000	550	1600 J
RACOCA2S2	10/22/2003	1019	54 U	85 U	690	150 U	11000	940 U	470 U	870 U	110 U	31000	850	1400 J
RACOCI1D1	10/22/2003	1210	54 U	61 U	780	150 U	13000	940 U	470 U	870 U	110 U	35000	450	2600
RACOCI1S1	10/22/2003	1158	54 U	85 U	1300	150 U	12000	940 U	470 U	870 U	110 U	38000	850	2700
RACOCI1S2	10/22/2003	1204	59 J	89 J	490	150 U	14000	940 U	470 U	870 U	110 U	42000	790	1300 J
RACOCL1D1	10/21/2003	1602	71 J	53 J	560 J	190 U	12000	580 U	340 U	320 U	90 U	30000	500	1600 J
RACOCL1S1	10/21/2003	1523	44 J	33 U	780	190 U	14000	580 U	340 U	320 U	90 U	35000	330	1800 J
RACOCL1S2	10/21/2003	1528	37 J	20 U	710	190 U	10000	580 U	340 U	320 U	90 U	19000	130	680 J
RACOJN1D1	10/21/2003	1448	29 U	21 J	600	190 U	9400	580 U	340 U	470 J	90 U	28000	180	1500 J
RACOJN1D1[illegible]	10/21/2003	1455	29 J	20 U	170 U	190 U	1200 U	580 U	340 U	320 U	90 U	2000 U	38 U	650 U
RACOJN1S1	10/21/2003	1420	29 U	32 J	540 J	190 U	15000	580 U	340 U	370 J	90 U	24000	210	1200 J
RACOJN1S2	10/21/2003	1426	57 J	58 J	780	190 U	8800	640 J	340 U	320 U	90 U	31000	520	2100 J
RACOJN1S3	10/21/2003	1437	31 J	44 J	940	190 U	27000	580 U	340 U	320 U	90 U	29000	340	2100 J
RACOSH1D1	10/21/2003	1737	47 J	51 U	750	190 U	9200	580 U	340 U	490 J	90 U	27000	510	1900 J
RACOSH1D1D	10/21/2003	1743	29 U	53 U	730	190 U	9200	580 U	340 U	660 J	90 U	27000	530	1600 J
RACOSH1S1	10/22/2003	1035	54 U	61 U	700	150 U	7200 J	940 U	470 U	870 U	110 U	30000	560	1500 J
RACOSH1S2	10/22/2003	1041	54 U	61 U	680	150 U	7900 J	940 U	470 U	870 U	110 U	27000	490	1300 J
RACOSH1S2[illegible]	10/22/2003	1046	54 U	61 U	110 U	150 U	2600 U	940 U	470 U	870 U	110 U	1900 U	43 U	560 U
RACOWH1D1	10/21/2003	1552	43 J	51 J	740	190 U	6500	580 U	340 U	470 J	90 U	31000	240	2400
RACOWH1S1	10/21/2003	1540	29 U	35 U	830	190 U	16000	580 U	340 U	370 J	90 U	29000	360	1500 J
RACOWH1S2	10/21/2003	1545	29 U	82 U	820	190 U	17000	580 U	340 U	320 U	90 U	38000	820	2100 J
RAEDSF1D1	10/21/2003	1334	48 J	73 U	870	190 U	8500	580 U	340 U	1200	160 J	69000	730	1700 J
RAEDSF1S1	10/21/2003	1345	91 J	110	750	190 U	14000	580 U	340 U	590 J	90 U	48000	120 J	1800 J
RAEDSF1S2	10/21/2003	1351	81 J	30 U	820	190 U	13000	580 U	340 U	620 J	90 U	43000	300	2100 J
RAGACA1D1	10/21/2003	1630	64 J	96 U	750	190 U	18000	580 U	340 U	420 J	170 J	37000	960	1300 J
RAGACA1D2	10/22/2003	905	68 J	61 U	300 J	150 U	51000	940 U	470 U	870 U	340 J	16000	43 U	560 U

U - The analyte was not detected above the detection limit. The detection limit is reported.

J - The associated numerical value is an estimated quantity between the detection limit and the quantitation limit.

TABLE 1A

Rico Argentine

SPECTRACE 9000 XRF DATA (PPM)

ID	DATE	TIME	Sb	As	Ba	Cd	Ca	CrHI	CrLO	Co	Cu	Fe	Pb	Mn
RAGACA1D2	10/22/2003	855	54 U	61 U	110 U	150 U	2600 U	940 U	470 U	870 U	110 U	1900 U	43 U	560 U
RAGACA1S1	10/21/2003	1749	31 J	220 U	640	190 U	19000	580 U	340 U	810 J	260 J	53000	2200	2300
RAGACA1S2	10/21/2003	1709	41 J	52 J	420 J	190 U	22000	580 U	340 U	540 J	380	25000	390	1000 J
RAGACN1D1	10/22/2003	1413	57 J	100 U	630	150 U	15000	940 U	470 U	870 U	210 J	31000	1000	1600 J
RAGACN1S1	10/22/2003	1402	54 U	130 U	590	150 U	13000	940 U	470 U	870 U	170 J	36000	1300	1600 J
RAGACN1S2	10/22/2003	1407	54 U	130 U	640	150 U	12000	940 U	470 U	870 U	210 J	34000	1300	1700 J
RAGADO1D1	10/22/2003	1311	54 U	260 U	650	150 U	9200	940 U	470 U	870 U	150 J	51000	2600	2400
RAGADO1S1	10/22/2003	1259	54 U	120 U	610	150 U	13000	940 U	470 U	870 U	110 U	34000	1200	1600 J
RAGADO1S2	10/22/2003	1305	54 U	230 U	640	150 U	9100	940 U	470 U	870 U	240 J	46000	2300	2200
RAGAEN1D1	10/22/2003	1356	54 U	150 U	610	150 U	13000	940 U	470 U	870 U	110 U	34000	1400	910 J
RAGAEN1S1	10/22/2003	1345	54 U	85 U	800	150 U	12000	940 U	470 U	870 U	150 J	30000	850	1000 J
RAGAEN1S2	10/22/2003	1350	54 U	190 U	680	150 U	12000	940 U	470 U	870 U	190 J	42000	1900	2300
RAGAGA1D1	10/18/2003	1011	59 J	77 U	610	210 U	10000	440 U	350 U	1300 U	170 U	31000	530	1500 J
RAGAGA1S1	10/18/2003	1019	57 U	77 U	520	210 U	21000	530 J	350 U	1300 U	170 U	30000	630	1700 J
RAGAGA1S2	10/18/2003	1014	57 U	77 U	700	210 U	7900	440 U	350 U	1300 U	170 U	24000	300	680 J
RAGAHO1D1	10/22/2003	1237	54 U	61 U	520	150 U	8700	940 U	470 U	870 U	110 U	30000	500	1700 J
RAGAHO1D1	10/22/2003	1243	54 U	61 U	610	150 U	9600	940 U	470 U	870 U	110 U	32000	600	1600 J
RAGAHO1S1	10/22/2003	1215	54 U	61 U	570	150 U	5800 J	940 U	470 U	870 U	110 U	19000	170	560 U
RAGAHO1S2	10/22/2003	1220	78 J	61 U	570	150 U	6900 J	940 U	470 U	870 U	110 U	21000	230	560 U
RAGAHO1S3	10/22/2003	1226	54 U	150 U	540	150 U	18000	940 U	470 U	870 U	110 U	28000	1500	1200 J
RAGAHO1S3B	0/22/2003	1232	54 U	61 U	110 U	150 U	2600 U	940 U	470 U	870 U	110 U	1900 U	43 U	560 U
RAGAKZ1D1	10/22/2003	1339	54 U	69 J	600	150 U	6100 J	940 U	470 U	870 U	110 U	27000	520	870 J
RAGAKZ1S1	10/22/2003	1317	54 U	67 U	630	150 U	9700	940 U	470 U	870 U	110 U	27000	670	1100 J
RAGAKZ1S2	10/22/2003	1322	54 U	110 U	600	150 U	9100	940 U	470 U	870 U	110 J	32000	1100	1600 J
RAGAKZ1S3	10/22/2003	1334	54 U	70 U	670	150 U	10000	940 U	470 U	870 U	110 U	26000	700	1300 J
RAGLLA1D1	10/22/2003	1147	54 U	61 U	660	150 U	8900	940 U	470 U	870 U	110 U	31000	240	1300 J
RAGLLA1S1	10/22/2003	1125	54 U	310 U	730	150 U	25000	940 U	470 U	870 U	110 U	42000	3100	3300
RAGLLA1S2	10/22/2003	1131	54 U	110 U	860	150 U	12000	940 U	470 U	870 U	110 U	39000	1100	1500 J
RAGLLA1S3	10/22/2003	1137	54 U	61 U	620	150 U	17000	940 U	470 U	870 U	110 U	19000	110 J	660 J
RAGLLA1S4	10/22/2003	1142	54 U	76 U	610	150 U	9300	940 U	470 U	870 U	110 U	25000	760	1600 J
RAHALI1D1	10/18/2003	1046	57 U	77 U	520	210 U	9100	440 U	350 U	1300 U	170 U	11000 J	82 U	710 J
RAHALI1S1	10/18/2003	1055	57 U	77 U	590	210 U	9800	440 U	350 U	1300 U	170 U	18000	230 J	930 J
RAHALI1S2	10/18/2003	1050	57 U	77 U	700	210 U	8000	440 U	350 U	1300 U	170 U	28000	620	1300 J
RAHARB01	10/21/2003	1057	45 J	460 U	340 J	190 U	62000	810 J	340 U	440 J	380	61000	4600	5200
RAHARB02	10/21/2003	1205	38 J	160 U	830	190 U	4300	680 J	340 U	1400	90 U	64000	1600	650 U

U - The analyte was not detected above the detection limit. The detection limit is reported.

J - The associated numerical value is an estimated quantity between the detection limit and the quantitation limit.

TABLE 1A

Rico Argentine

SPECTRACE 9000 XRF DATA (PPM)

ID	DATE	TIME	Sb	As	Ba	Cd	Ca	CrHI	CrLO	Co	Cu	Fe	Pb	Mn
RAHARB03	10/21/2003	1103	340	6500 U	600	190 U	13000	2600	340 U	770 J	1700	51000	65000	1700 J
RAHARB04	10/21/2003	1210	59 J	430 U	840	190 U	6500	580 U	340 U	750 J	440	67000	4300	2300
RAHARB05	10/21/2003	1237	64 J	850 U	660	190 U	7100	580 U	340 U	730 J	550	55000	8500	1500 J
RAHARB06	10/21/2003	1109	36 J	240 U	750	190 U	5100	970 J	340 U	1100 J	180 J	83000	2400	920 J
RAHARB07	10/21/2003	1126	29 U	160 U	680	190 U	4400	580 U	340 U	360 J	90 U	41000	1600	650 U
RAHARB08	10/21/2003	1114	52 J	310 U	560 J	190 U	28000	580 U	340 U	750 J	470	102224	3100	1400 J
RAHARB09	10/21/2003	1132	55 J	290 U	610	190 U	4400	580 U	340 U	320 U	90 U	35000	2900	650 U
RAHARE1D1	10/18/2003	1115	57 U	360 U	600	210 U	6100	470 J	350 U	1300 U	210 J	33000	3600	1000 J
RAHARE1S1	10/18/2003	1125	57 U	240 U	650	210 U	12000	440 U	350 U	1300 U	170 U	35000	2400	1900 J
RAHARE1S3	10/18/2003	1119	57 U	77 U	610	210 U	3000 J	440 U	350 U	1300 U	170 U	9600 J	82 U	810 J
RAHARO1D1	10/18/2003	1103	65 J	290 U	580	210 U	17000	700 J	350 U	1300 U	410 J	41000	2900	2300
RAHARO1S1	10/18/2003	1111	97 J	500 U	780	210 U	10000	1300 J	350 U	1300 U	410 J	51000	5000	2000
RAHARO1S2	10/18/2003	1107	57 U	240 U	660	210 U	11000	550 J	350 U	1300 U	320 J	40000	2400	2000 J
RAHICN1D1	10/22/2003	1429	54 U	87 U	600	150 U	6300 J	940 U	470 U	870 U	110 U	33000	870	2000
RAHICN1S1	10/22/2003	1419	54 U	130 U	670	150 U	17000	940 U	470 U	870 U	140 J	37000	1300	1700 J
RAHICN1S2	10/22/2003	1424	54 U	150 U	620	150 U	11000	940 U	470 U	870 U	110 U	39000	1500	2700
RAHYFS1D1	10/21/2003	1120	41 J	27 J	580	190 U	8400	580 U	340 U	320 U	90 U	25000	43 J	650 U
RAHYFS1S1	10/21/2003	1045	39 J	36 J	600	190 U	10000	580 U	340 U	320 U	90 U	26000	85 J	930 J
RAHYFS1S2	10/21/2003	1051	65 J	25 J	630	190 U	9000	580 U	340 U	320 U	90 U	27000	47 J	650 U
RAKICA1D1	10/18/2003	1416	57 U	77 U	1100	210 U	8800	440 U	350 U	1300 U	170 U	36000	220 J	5600
RAKICA1S1	10/18/2003	1429	57 U	77 U	710	210 U	8600	530 J	350 U	1300 U	170 U	27000	300	2200
RAKICA1S2	10/18/2003	1420	57 U	77 U	800	210 U	9800	440 U	350 U	1300 U	170 U	37000	450	3300
RAMAHE1D1	10/21/2003	1641	33 J	52 U	640	190 U	5800	580 U	340 U	620 J	90 U	33000	520	1500 J
RAMAHE1S1	10/22/2003	1001	54 U	71 U	780	150 U	9100	940 U	470 U	870 U	110 U	33000	710	810 J
RAMAHE1S2	10/21/2003	1726	30 J	110 U	530 J	190 U	9500	580 U	340 U	520 J	90 U	37000	1000	990 J
RAMIWL1D1	10/21/2003	1704	41 J	24 U	550 J	190 U	7500	580 U	340 U	320 J	90 U	22000	240	1200 J
RAMIWL1S1	10/21/2003	1625	42 J	20 U	590	190 U	8300	580 U	340 U	320 U	90 U	18000	38 U	660 J
RAMIWL1S2	10/21/2003	1658	42 J	46 U	480 J	190 U	8600	580 U	340 U	370 J	90 U	24000	460	1000 J
RAPIME1D1	10/21/2003	1409	30 J	20 U	620	190 U	8300	580 U	340 U	320 U	90 U	25000	89 J	1500 J
RAPIME1S1	10/21/2003	1358	29 U	26 J	590	190 U	8800	580 U	340 U	380 J	90 U	25000	63 J	1200 J
RAPIME1S2	10/21/2003	1404	72 J	20 U	620	190 U	10000	580 U	340 U	530 J	90 U	22000	150	770 J
RAPKMI1D1	10/21/2003	1443	49 J	33 J	940	190 U	12000	630 J	340 U	380 J	90 U	47000	38 U	1800 J
RAPKMI1S1	10/21/2003	1414	65 J	71	760	190 U	13000	580 U	340 U	320 U	90 U	50000	170	2800
RAPKMI1S2	10/21/2003	1305	76 J	99	910	190 U	12000	580 U	340 U	350 J	180 J	50000	600	1600 J
RAPKWT1D1	10/21/2003	1259	29 U	33 J	840	190 U	12000	580 U	340 U	320 U	90 U	46000	160	2000 J

U - The analyte was not detected above the detection limit. The detection limit is reported.

J - The associated numerical value is an estimated quantity between the detection limit and the quantitation limit.

TABLE 1A

Rico Argentine

SPECTRACE 9000 XRF DATA (PPM)

ID	DATE	TIME	Sb	As	Ba	Cd	Ca	CrHI	CrLO	Co	Cu	Fe	Pb	Mn
RAPKWT1S1	10/21/2003	1249	37 J	59 J	780	190 U	13000	580 U	340 U	480 J	90 U	51000	160	1900 J
RAPKWT1S2	10/21/2003	1254	29 U	77	770	190 U	13000	580 U	340 U	830 J	90 U	50000	400	2200
RARIFE1D1	10/18/2003	1026	57 U	77 U	590	210 U	7600	460 J	350 U	1300 U	170 U	24000	200 J	1100 J
RARIFE1D1D	10/18/2003	1022	57 U	77 U	610	210 U	6500	580 J	350 U	1300 U	170 U	27000	250 J	810 J
RARIFE1S1	10/18/2003	1042	57 U	77 U	680	210 U	10000	440 U	350 U	1300 U	170 U	26000	330	1000 J
RARIFE1S2	10/18/2003	1038	71 J	77 U	640	210 U	7700	440 U	350 U	1300 U	170 U	26000	260 J	1000 J
RARIFE1S3	10/18/2003	1034	57 U	77 U	610	210 U	8100	440 U	350 U	1300 U	170 U	27000	340	1000 J
RARIFE1S3B	10/18/2003	1030	57 U	77 U	130 U	210 U	1600 U	440 U	350 U	1300 U	170 U	3400 U	82 U	600 U
RARIGS1D1	10/21/2003	1557	29 U	61 U	550 J	190 U	4600	580 U	340 U	320 U	90 U	25000	610	950 J
RARIGS1S1	10/21/2003	1501	53 J	130 U	660	190 U	14000	580 U	340 U	1100	90 U	81000	1300	2100 J
RARIGS1S1D	10/21/2003	1506	55 J	120 U	690	190 U	11000	580 U	370 J	1000 J	90 U	79000	1200	2500
RARIGS1S2	10/21/2003	1511	38 J	130 U	650	190 U	9000	580 U	340 U	550 J	90 U	31000	1300	1600 J
RARIGS1S3	10/21/2003	1517	83 J	84 U	630	190 U	12000	780 J	340 U	370 J	90 U	27000	850	910 J
RARILE1D1	10/18/2003	1130	57 U	82 U	630	210 U	9300	570 J	350 U	1300 U	170 U	31000	820	2200
RARILE1S1	10/18/2003	1142	57 U	100 U	750	210 U	12000	520 J	350 U	1300 U	170 U	30000	1000	1200 J
RARILE1S2	10/18/2003	1138	57 U	77 U	830	210 U	12000	440 U	350 U	1300 U	170 U	30000	570	1300 J
RARILE1S3	10/18/2003	1134	62 J	77 U	420 J	210 U	20000	440 J	350 U	1300 U	170 U	16000	150 J	600 U
RASDGR1D1	10/21/2003	1228	29 U	20 U	740	190 U	9200	580 U	340 U	320 U	90 U	14000	38 U	650 U
RASDGR1S1	10/21/2003	1138	29 U	20 U	570 J	190 U	9300	580 U	340 U	320 U	90 U	24000	38 U	650 U
RASDGR1S1B	10/21/2003	1143	29 U	20 U	170 U	190 U	1200 U	580 U	340 U	320 U	90 U	2000 U	38 U	650 U
RASDGR1S2	10/21/2003	1216	55 J	22 J	710	190 U	9500	580 U	340 U	500 J	90 U	27000	44 J	870 J
RASDGR1S2D	10/21/2003	1222	50 J	20 U	610	190 U	9500	580 U	340 U	350 J	90 U	25000	38 U	940 J
RASDGR1S3	10/21/2003	1243	31 J	20 U	680	190 U	11000	580 U	340 U	320 U	90 U	28000	38 U	1000 J
RASDGR1S4	10/21/2003	1340	40 J	21 J	690	190 U	7200	580 U	340 U	320 U	90 U	32000	38 U	1100 J
RASHBE1D1	10/22/2003	1120	54 U	61 U	670	150 U	6400 J	940 U	470 U	870 U	110 U	25000	450	1200 J
RASHBE1S1	10/22/2003	1109	54 U	130 U	750	150 U	9300	940 U	470 U	870 U	110 U	42000	1300	2300
RASHBE1S2	10/22/2003	1114	62 J	140 U	610	150 U	15000	940 U	470 U	870 U	110 J	38000	1400	1400 J
RASHCO1D1	10/22/2003	1619	68 J	120 U	600	150 U	9800	940 U	470 U	870 U	120 J	39000	1200	1700 J
RASHCO1S1	10/22/2003	1608	54 U	220 U	620	150 U	13000	940 U	470 U	870 U	120 J	42000	2200	2100
RASHCO1S2	10/22/2003	1613	54 U	200 U	600	150 U	11000	940 U	470 U	950 J	110 U	35000	2000	2500
RASHDA1D1	10/22/2003	1602	54 U	61 U	660	150 U	6500 J	940 U	470 U	870 U	110 U	35000	460	1500 J
RASHDA1S1	10/22/2003	1551	54 U	110 U	680	150 U	6200 J	940 U	470 U	870 U	140 J	49000	1100	1400 J
RASHDA1S2	10/22/2003	1556	61 J	170 U	620	150 U	16000	940 U	470 U	870 U	110 U	37000	1700	2400
RASICU1D1	10/18/2003	1557	57 U	77 U	570	210 U	7300	700 J	350 U	1300 U	170 U	25000	82 U	1700 J
RASICU1S1	10/18/2003	1549	69 J	77 U	580	210 U	12000	440 U	350 U	1300 U	170 U	31000	330	920 J

U - The analyte was not detected above the detection limit. The detection limit is reported.

J - The associated numerical value is an estimated quantity between the detection limit and the quantitation limit.

TABLE 1A

Rico Argentine

SPECTRACE 9000 XRF DATA (PPM)

ID	DATE	TIME	Sb	As	Ba	Cd	Ca	CrHI	CrLO	Co	Cu	Fe	Pb	Mn
RASICU1S2	10/18/2003	1553	57 U	77 U	510	210 U	11000	440 U	350 U	1300 U	170 U	27000	82 U	600 U
RASIKI1D1	10/18/2003	1513	66 J	77 U	700	210 U	13000	440 U	350 U	1300 U	170 U	29000	82 U	1000 J
RASIKI1S1	10/18/2003	1521	57 U	77 U	620	210 U	11000	860 J	350 U	1300 U	170 U	35000	210 J	1000 J
RASIKI1S2	10/18/2003	1517	57 U	77 U	670	210 U	13000	440 U	350 U	1300 U	170 U	36000	170 J	1500 J
RASIST1D1	10/18/2003	1529	57 U	77 U	600	210 U	11000	570 J	350 U	1300 U	170 U	30000	86 J	1900 J
RASIST1S1	10/18/2003	1546	70 J	77 U	580	210 U	8500	440 U	350 U	1300 U	170 U	28000	260 J	1900 J
RASIST1S1D	10/18/2003	1541	57 U	77 U	570	210 U	9800	870 J	350 U	1300 U	170 U	31000	250 J	840 J
RASIST2S1	10/18/2003	1534	57 U	77 U	690	210 U	11000	680 J	350 U	1300 U	170 U	29000	230 J	2900
RASIST3S1	10/18/2003	1525	57 U	77 U	860	210 U	17000	440 U	350 U	1300 U	170 U	28000	82 U	1300 J
RASOBO1D1	10/22/2003	1657	54 U	180 U	640	150 U	9700	940 U	470 U	870 U	110 U	35000	1800	2300
RASOBO1S1	10/22/2003	1646	54 U	61 U	760	150 U	13000	940 U	470 U	870 U	110 U	21000	550	1300 J
RASOBO1S2	10/22/2003	1652	54 U	130 U	530	150 U	8100 J	940 U	470 U	870 U	110 U	33000	1200	2100
RASOHE1D1	10/22/2003	1740	54 U	920 U	810	150 U	50000	1100 J	470 U	870 U	270 J	37000	9200	3300
RASOHE1S1	10/22/2003	1702	54 U	61 U	670	150 U	8100 J	940 U	470 U	870 U	110 U	20000	300	730 J
RASOHE1S2	10/22/2003	1708	99 J	1800 U	800	150 U	9000	940 U	470 U	870 U	220 J	45000	18000	2800
RASOHE1S2B	10/22/2003	1714	54 U	61 U	110 U	150 U	2600 U	940 U	470 U	870 U	110 U	1900 U	43 J	560 U
RASOHE1S3	10/22/2003	1719	62 J	230 U	1100	150 U	24000	940 U	470 U	870 U	130 J	36000	2300	3100
RASOHE1S3D	10/22/2003	1725	54 U	220 U	1000	150 U	24000	940 U	470 U	870 U	210 J	38000	2100	4300
RASOIR1D1	10/22/2003	1635	54 U	73 J	540	150 U	5100 J	940 U	470 U	870 U	110 U	30000	520	830 J
RASOIR1S1	10/22/2003	1625	54 U	68 U	610	150 U	8200 J	940 U	470 U	870 U	110 U	26000	680	1100 J
RASOIR1S2	10/22/2003	1630	54 J	89 J	630	150 U	7500 J	940 U	470 U	870 U	110 U	26000	670	1600 J
RASVCN1D1	10/22/2003	1455	54 U	180 U	700	150 U	12000	940 U	470 U	870 U	220 J	39000	1800	2100
RASVCN1D1B	10/22/2003	1501	54 U	61 U	110 U	150 U	2600 U	940 U	470 U	870 U	110 U	1900 U	43 U	560 U
RASVCN1S1	10/22/2003	1435	54 U	270 U	630	150 U	15000	940 U	470 U	870 U	180 J	41000	2700	1800 J
RASVCN1S2	10/22/2003	1446	54 U	230 U	580	150 U	14000	940 U	470 U	870 U	240 J	35000	2300	1800 J
RASVCN2D1	10/22/2003	1523	56 J	270 U	630	150 U	10000	940 U	470 U	870 U	180 J	36000	2700	1900
RASVCN2S1	10/22/2003	1506	54 U	190 U	740	150 U	85000	940 U	470 U	870 U	300 J	39000	1900	1200 J
RASVCN2S1D	10/22/2003	1512	54 U	190 U	690	150 U	77000	940 U	470 U	870 U	160 J	38000	1900	1900
RASVCN2S2	10/22/2003	1517	55 J	240 U	710	150 U	9300	940 U	470 U	870 U	110 U	33000	2400	2200
RASVFO1D1	10/21/2003	1635	51 J	28 J	620	190 U	7700	580 U	340 U	320 U	90 U	26000	150	650 U
RASVFO1S1	10/21/2003	1714	29 U	82 U	770	190 U	18000	580 U	340 U	320 U	100 J	33000	820	1400 J
RASVFO1S1D	10/21/2003	1720	47 J	79 U	820	190 U	16000	580 U	340 U	320 U	110 J	35000	790	1400 J
RASVFO1S2	10/21/2003	1807	78 J	36 U	590	190 U	11000	580 U	340 U	320 U	90 U	29000	360	990 J
RASVFO2D1	10/22/2003	938	91 J	120 U	540	150 U	35000	940 U	470 U	870 U	110 U	25000	1200	1500 J
RASVFO2S1	10/22/2003	927	54 U	140 U	670	150 U	23000	940 U	470 U	870 U	110 U	33000	1400	2400

U - The analyte was not detected above the detection limit. The detection limit is reported.

J - The associated numerical value is an estimated quantity between the detection limit and the quantitation limit.

TABLE 1A

Rico Argentine

SPECTRACE 9000 XRF DATA (PPM)

ID	DATE	TIME	Sb	As	Ba	Cd	Ca	CrHI	CrLO	Co	Cu	Fe	Pb	Mn
RASVFO2S2	10/22/2003	933	100 J	150 U	800	150 U	9900	940 U	470 U	870 U	110 J	60000	1500	1700 J
RASVFO3D1	10/22/2003	955	54 U	61 U	580	150 U	21000	940 U	470 U	870 U	110 U	26000	460	1200 J
RASVFO3S1	10/22/2003	944	68 J	87 U	600	150 U	22000	940 U	470 U	870 U	110 U	29000	870	1300 J
RASVFO3S2	10/22/2003	950	54 U	72 U	540	150 U	19000	940 U	470 U	870 U	110 U	32000	720	1100 J
RASVKR1D1	10/21/2003	1619	51 J	37 J	930	190 U	15000	600 J	340 U	320 U	190 J	31000	84 J	5700
RASVKR1S1	10/21/2003	1608	37 J	29 U	810	190 U	16000	700 J	340 U	320 U	90 U	41000	290	6600
RASVKR1S2	10/21/2003	1613	29 U	20 U	750	190 U	9700	650 J	340 U	370 J	90 U	30000	78 J	5900
RAYEMU1D1	10/22/2003	1540	54 U	150 U	660	150 U	7500 J	940 U	470 U	870 U	110 U	37000	1500	1600 J
RAYEMU1S1	10/22/2003	1529	54 U	160 U	670	150 U	14000	940 U	470 U	870 U	110 U	43000	1500	1700 J
RAYEMU1S2	10/22/2003	1534	54 U	140 U	620	150 U	13000	940 U	470 U	870 U	110 U	37000	1400	1200 J

U - The analyte was not detected above the detection limit. The detection limit is reported.

J - The associated numerical value is an estimated quantity between the detection limit and the quantitation limit.

TABLE 1B

Rico Argentine

SPECTRACE 9000 XRF DATA (PPM)

ID	Hg	Mo	Ni	K	Rb	Se	Ag	Sr	Th	Sn	Ti	U	Zn	Zr
RAARCA1D1	110 U	8.5 U	250 J	20000	120	57 U	130 U	83 J	18 J	130 J	3100	27 U	2200	190
RAARCA1S1	110 U	8.6 J	140 U	22000	91 J	57 U	130 U	200	11 U	160 J	3500	27 U	1200	290
RAARCA1S2	110 U	8.5 U	140 U	22000	110	57 U	130 U	120 J	11 U	110 U	4000	27 U	850	300
RAARCR1D1	110 U	8.5 U	140 U	14000	66 J	57 U	130 U	360	22 J	130 J	1500 J	27 U	170 U	190
RAARCR1D2	110 U	8.5 U	140 U	20000	120	57 U	130 U	110 J	11 U	170 J	2400	27 U	2000	250
RAARCR1S1	110 U	8.5 U	140 U	21000	110	57 U	130 U	170	13 J	140 J	4400	27 U	1200	290
RAARCR1S2	110 U	8.5 U	300 J	21000	76 J	57 U	130 U	110 J	16 J	150 J	3400	27 U	1000	320
RAARCR1S3	110 U	8.5 U	140 U	20000	68 J	57 U	130 U	93 J	21 J	140 J	2800	27 U	1000	280
RAARHA1D1	110 U	8.5 U	140 U	13000	100 J	57 U	130 U	100 J	11 U	150 J	2500	27 U	1400	250
RAARHA1D1B	110 U	8.5 U	140 U	2200 U	32 U	57 U	130 U	44 U	11 U	110 U	570 U	27 U	170 U	30 U
RAARHA1S1	110 U	8.5 U	140 U	19000	88 J	57 U	130 U	170	11 U	110 U	3000	27 U	1700	280
RAARHA1S2	110 U	8.5 U	140 U	20000	98 J	57 U	130 U	120 J	16 J	140 J	3300	27 U	330 J	290
RAARJO1D1	110 U	8.5 U	140 U	17000	92 J	57 U	130 U	220	12 J	180 J	3000	27 U	610	290
RAARJO1S1	110 U	8.5 U	140 U	18000	110	57 U	130 U	150	22 J	180 J	3200	27 U	780	290
RAARJO1S2	110 U	8.5 U	140 U	21000	120	57 U	130 U	200	25 J	150 J	3500	27 U	1900	290
RAARRI1S1	110 U	8.5 U	140 U	18000	65 J	57 U	130 U	240	11 U	120 J	2900	27 U	600	260
RAARSC1D1	110 U	8.5 U	140 U	16000	85 J	57 U	130 U	140 J	11 U	150 J	2300	27 U	1700	240
RAARSC1S1	110 U	8.5 U	150 J	18000	110	57 U	130 U	150 J	11 U	140 J	3400	27 U	1900	330
RAARSC1S1B	110 U	8.5 U	140 U	2200 U	32 U	57 U	130 U	44 U	11 U	110 U	570 U	27 U	170 U	65 J
RAARSC1S2	110 U	8.5 U	140 U	21000	110	57 U	130 U	160	29 J	140 J	3200	27 U	2000	300
RAARSC1S2D	110 U	8.5 U	140 U	19000	120	57 U	130 U	130 J	15 J	170 J	3600	27 U	2000	320
RAARTP1D1	110 U	9.6 J	140 U	15000	83 J	57 U	130 U	140 J	11 U	150 J	3200	27 U	1600	270
RAARTP1S1	110 U	8.5 U	140 U	18000	84 J	57 U	130 U	140 J	20 J	160 J	3100	27 U	1500	350
RAARTP1S2	110 U	8.5 U	140 U	20000	120	57 U	130 U	150 J	26 J	160 J	4000	27 U	1800	330
RAARTP1S3	110 U	8.5 U	220 J	15000	56 J	57 U	130 U	250	15 J	110 U	2500	27 U	170 U	330
RAARTP1S4	110 U	8.5 U	230 J	16000	62 J	57 U	130 U	260	11 U	140 J	1700 J	27 U	170 U	190
RAARWI1D1	110 U	8.5 U	140 U	13000	79 J	57 U	130 U	110 J	18 J	180 J	2500	27 U	1400	260
RAARWI1S1	110 U	8.5 U	140 U	16000	57 J	57 U	130 U	180	33 J	200 J	4200	27 U	1700	350
RAARWI1S2	110 U	8.5 U	140 U	19000	96 J	57 U	130 U	110 J	11 U	130 J	3600	27 U	980	330
RAARWI1S2D	110 U	8.5 U	180 J	18000	120	57 U	130 U	130 J	32 J	120 J	3100	27 U	1100	340
RACASC1D1	110 U	8.5 U	140 U	16000	84 J	57 U	130 U	140 J	15 J	160 J	3000	27 U	1400	280
RACASC1S1	110 U	8.5 U	180 J	18000	130	57 U	130 U	180	13 J	200 J	3200	27 U	2000	280
RACASC1S2	110 U	8.5 U	140 U	19000	100 J	57 U	130 U	170	18 J	120 J	3200	27 U	1600	340
RACASC3D1	110 U	8.5 U	160 J	17000	100 J	57 U	130 U	120 J	14 J	170 J	3200	27 U	1800	260
RACASC3S1	110 U	8.5 U	140 U	17000	70 J	57 U	130 U	150 J	32 J	150 J	3600	27 U	1800	330

U - The analyte was not detected above the detection limit. the detection limit is reported.

J - The associated numerical value is an estimated quantity between the detection limit and the quantitation limit.

TABLE 1B

Rico Argentine

SPECTRACE 9000 XRF DATA (PPM)

ID	Hg	Mo	Ni	K	Rb	Se	Ag	Sr	Th	Sn	Ti	U	Zn	Zr
RACASC3S2	110 U	8.5 U	140 U	18000	110	57 U	130 U	140 J	30 J	140 J	3600	27 U	1800	300
RACASC3S3	110 U	8.5 U	140 U	16000	54 J	57 U	130 U	330	11 U	130 J	2200	27 U	170 U	200
RACOAD1D1	97 U	11 U	160 U	14000	80	16 U	84 U	150 J	14 U	180 J	3300 J	16 U	1300	240
RACOAD1S1	97 U	11 U	160 U	17000	82	16 U	84 U	170	26 J	160 J	3600 J	16 U	1400	280
RACOAD1S2	97 U	11 U	160 U	18000	66	16 U	84 U	150	14 U	130 U	3900 J	27 J	1200	310
RACOCA1D1	97 U	11 U	160 U	15000	75	16 U	84 U	120 J	17 J	160 J	3300 J	16 U	920	270
RACOCA1S1	73 U	11 U	150 U	19000	96	25 U	120 U	130	35	170 J	4300	25 U	1200	330
RACOCA1S2	73 U	11 U	150 U	18000	98	25 U	120 U	130	22 J	120 J	3400	25 U	1500	300
RACOCA2D1	97 U	11 U	160 U	13000	97	16 U	84 U	160	20 J	170 J	3600 J	16 U	2200	260
RACOCA2S1	97 U	11 U	160 U	18000	110	16 U	84 U	170	19 J	140 J	4100 J	16 U	2400	290
RACOCA2S2	97 U	11 U	160 U	18000	110	16 U	84 U	150 J	17 J	140 J	3500 J	16 U	1800	290
RACOCI1D1	97 U	11 U	160 U	17000	99	16 U	84 U	130 J	16 J	130 J	3000 J	16 U	1300	180
RACOCI1S1	97 U	11 U	160 U	20000	91	16 U	84 U	130 J	26 J	140 J	3800 J	16 U	2500	280
RACOCI1S2	97 U	11 U	160 U	12000	64	16 U	84 U	160	14 U	170 J	4900	16 U	1800	300
RACOCL1D1	73 U	11 U	150 U	16000	85 J	25 U	120 U	130	16 J	120 J	2100	25 U	1600	210
RACOCL1S1	73 U	11 U	150 U	26000	120	25 U	120 U	160	20 J	92 J	3600	25 U	1300	280
RACOCL1S2	73 U	11 U	150 U	21000	96	25 U	120 U	130	16 J	74 U	3100	25 U	260	370
RACOJN1D1	73 U	11 U	150 U	17000	110	25 U	120 U	110	9.8 U	120 J	2700	25 U	2000	240
RACOJN1D1B	73 U	11 U	150 U	1300 U	26 U	25 U	120 U	33 U	9.8 U	74 U	460 U	25 U	68 U	25 J
RACOJN1S1	73 U	11 U	150 U	18000	93	25 U	120 U	140	11 J	130 J	2300	25 U	1200	340
RACOJN1S2	73 U	11 U	150 U	22000	110	25 U	120 U	180	21 J	92 J	3000	25 U	980	330
RACOJN1S3	73 U	11 U	150 U	19000	67 J	25 U	120 U	200	32 J	74 U	3900	25 U	970	230
RACOSH1D1	73 U	11 U	150 U	16000	87	25 U	120 U	130	16 J	150 J	3900	25 U	1100	260
RACOSH1D1D	73 U	11 U	150 U	14000	72 J	25 U	120 U	130	20 J	170 J	4200	25 U	1000	260
RACOSH1S1	97 U	11 U	160 U	19000	100	16 U	84 U	140 J	14 U	140 J	3700 J	16 U	1300	310
RACOSH1S2	97 U	11 U	160 U	17000	97	16 U	84 U	130 J	14 U	130 U	3400 J	16 U	950	360
RACOSH1S2B	97 U	11 U	160 U	2900 U	15 U	16 U	84 U	44 U	14 U	130 U	1300 U	16 U	88 U	30 U
RACOWH1D1	73 U	11 U	150 U	19000	100	25 U	120 U	130	22 J	140 J	2800	25 U	1400	250
RACOWH1S1	73 U	11 U	150 U	23000	100	25 U	120 U	150	14 J	98 J	3300	25 U	710	290
RACOWH1S2	73 U	11 U	150 U	23000	110	25 U	120 U	170	21 J	140 J	3500	25 U	2200	280
RAEDSF1D1	73 U	11 U	150 U	21000	96	25 U	120 U	380	23 J	170 J	4200	25 U	530	340
RAEDSF1S1	73 U	11 U	150 U	20000	94	25 U	120 U	390	12 J	210 J	3700	25 U	570	240
RAEDSF1S2	73 U	11 U	150 U	20000	84 J	25 U	120 U	380	14 J	130 J	4100	25 U	540	240
RAGACA1D1	73 U	11 U	150 U	17000	88	25 U	120 U	160	13 J	87 J	2400	25 U	2900	190
RAGACA1D2	97 U	11 U	160 U	10000	61	16 U	84 U	290	14 U	180 J	1500 J	16 U	4000	160

U - The analyte was not detected above the detection limit. the detection limit is reported.

J - The associated numerical value is an estimated quantity between the detection limit and the quantitation limit.

TABLE 1B

Rico Argentine

SPECTRACE 9000 XRF DATA (PPM)

ID	Hg	Mo	Ni	K	Rb	Se	Ag	Sr	Th	Sn	Ti	U	Zn	Zr
RAGACA1D2B	97 U	11 U	160 U	2900 U	15 U	16 U	84 U	44 U	14 U	130 U	1300 U	16 U	88 U	37 J
RAGACA1S1	73 U	11 U	150 U	18000	99	25 U	120 U	120	9.8 U	190 J	3500	25 U	3000	250
RAGACA1S2	73 U	11 U	150 U	17000	79 J	25 U	120 U	190	9.8 U	140 J	2700	25 U	3600	250
RAGACN1D1	97 U	11 U	160 U	16000	120	16 U	84 U	130 J	16 J	130 J	2800 J	16 U	5400	260
RAGACN1S1	97 U	11 U	160 U	17000	100	16 U	84 U	130 J	23 J	160 J	3400 J	16 U	6000	280
RAGACN1S2	97 U	11 U	160 U	19000	130	16 U	84 U	140 J	16 J	130 U	3500 J	16 U	5000	300
RAGADO1D1	97 U	11 U	160 U	12000	91	16 U	84 U	130 J	25 J	130 U	2100 J	16 U	3800	200
RAGADO1S1	97 U	11 U	160 U	17000	97	16 U	84 U	120 J	16 J	130 U	3400 J	16 U	2000	280
RAGADO1S2	97 U	11 U	160 U	16000	92	16 U	84 U	140 J	14 U	130 U	2600 J	16 U	3300	210
RAGAEN1D1	97 U	11 U	160 U	15000	91	16 U	84 U	150	40 J	190 J	2800 J	16 U	3400	250
RAGAEN1S1	97 U	11 U	160 U	17000	98	16 U	84 U	160	14 U	130 U	4000 J	16 U	3500	300
RAGAEN1S2	97 U	11 U	160 U	17000	100	16 U	84 U	150	16 J	140 J	3700 J	16 U	3900	300
RAGAGA1D1	110 U	8.5 U	140 U	15000	97 J	57 U	130 U	110 J	14 J	150 J	2900	27 U	1500	260
RAGAGA1S1	110 U	8.5 U	140 U	16000	110	57 U	130 U	180	11 U	160 J	3900	27 U	2600	300
RAGAGA1S2	110 U	8.5 U	140 U	18000	89 J	57 U	130 U	140 J	23 J	110 U	3700	27 U	970	400
RAGAHO1D1	97 U	11 U	160 U	14000	68	16 U	84 U	330	20 J	130 U	2300 J	16 U	1000	240
RAGAHO1D1D	97 U	11 U	160 U	12000	71	16 U	84 U	310	20 J	130 U	2900 J	16 U	940	260
RAGAHO1S1	97 U	11 U	160 U	17000	82	16 U	84 U	93 J	14 U	130 U	2600 J	16 U	420	310
RAGAHO1S2	97 U	11 U	160 U	19000	74	16 U	84 U	100 J	14 U	130 U	3300 J	16 U	450	340
RAGAHO1S3	97 U	11 U	160 U	17000	69	16 U	84 U	100 J	14 U	130 U	3100 J	16 U	2200	330
RAGAHO1S3B	97 U	11 U	160 U	2900 U	15 U	16 U	84 U	44 U	14 U	130 U	1300 U	16 U	88 U	31 J
RAGAKZ1D1	97 U	11 U	160 U	16000	100	16 U	84 U	110 J	14 U	130 U	3300 J	16 U	1400	270
RAGAKZ1S1	97 U	11 U	160 U	17000	77	16 U	84 U	130 J	14 U	130 U	3100 J	18 J	1400	350
RAGAKZ1S2	97 U	11 U	160 U	17000	98	16 U	84 U	140 J	14 U	140 J	3600 J	16 U	2400	280
RAGAKZ1S3	97 U	11 U	160 U	19000	100	16 U	84 U	160	14 U	130 U	3700 J	17 J	1500	310
RAGLLA1D1	97 U	15 J	160 U	19000	130	16 U	84 U	200	15 J	130 U	3700 J	18 J	610	260
RAGLLA1S1	97 U	11 U	160 U	17000	110	16 U	84 U	160	20 J	130 U	3800 J	16 U	5700	240
RAGLLA1S2	97 U	11 U	160 U	20000	100	16 U	84 U	150	14 U	160 J	3400 J	16 U	1600	360
RAGLLA1S3	97 U	11 U	160 U	19000	88	16 U	84 U	150	14 U	130 U	3300 J	16 U	340	350
RAGLLA1S4	97 U	11 U	160 U	19000	86	16 U	84 U	120 J	14 U	130 U	4000 J	16 U	1300	360
RAHALI1D1	110 U	8.5 U	140 U	14000	83 J	57 U	130 U	90 J	19 J	110 U	1300 J	27 U	170 U	170
RAHALI1S1	110 U	8.5 U	140 U	17000	61 J	57 U	130 U	120 J	11 U	110 U	3300	27 U	310 J	310
RAHALI1S2	110 U	8.5 U	140 U	19000	120	57 U	130 U	140 J	11 U	110 U	2800	27 U	960	270
RAHARB01	73 U	11 U	150 U	7600	78 J	25 U	120 U	110	27 J	130 J	1500 J	25 U	11000	97
RAHARB02	73 U	11 U	150 U	18000	110	25 U	120 U	100 J	9.8 U	100 J	2600	25 U	860	230

U - The analyte was not detected above the detection limit. the detection limit is reported.

J - The associated numerical value is an estimated quantity between the detection limit and the quantitation limit.

TABLE 1B

Rico Argentine

SPECTRACE 9000 XRF DATA (PPM)

ID	Hg	Mo	Ni	K	Rb	Se	Ag	Sr	Th	Sn	Ti	U	Zn	Zr
RAHARB03	230 J	13 J	260 J	7700	73 J	25 U	120 U	120	88	430	810 J	25 U	22000	62 J
RAHARB04	73 U	11 U	150 U	11000	72 J	25 U	120 U	180	19 J	220 J	3300	25 U	9200	200
RAHARB05	73 U	11 U	150 U	14000	93	25 U	120 U	110 J	20 J	190 J	2200	25 U	6100	170
RAHARB06	73 U	11 U	150 U	14000	86 J	25 U	120 U	160	9.8 U	160 J	3600	25 U	1200	230
RAHARB07	73 U	11 U	150 U	19000	95	25 U	120 U	150	12 J	130 J	2100	25 U	1700	200
RAHARB08	73 U	19 J	150 U	13000	79 J	25 U	120 U	78 J	9.8 U	76 J	2100	25 U	1700	150
RAHARB09	73 U	11 U	150 U	18000	98	25 U	120 U	120	16 J	87 J	2600	25 U	1400	260
RAHARE1D1	110 U	11 J	140 U	16000	98 J	57 U	130 U	120 J	24 J	180 J	2000	27 U	2300	240
RAHARE1S1	110 U	8.5 U	140 U	20000	92 J	57 U	130 U	140 J	18 J	190 J	3600	27 U	2100	280
RAHARE1S3	110 U	8.5 U	140 U	24000	38 J	57 U	130 U	63 J	16 J	110 U	1100 J	27 U	170 U	270
RAHARO1D1	110 U	11 J	140 U	13000	73 J	57 U	130 U	140 J	11 U	170 J	2000	27 U	3400	160
RAHARO1S1	110 U	8.5 U	140 U	20000	80 J	57 U	130 U	150 J	11 U	160 J	2900	27 U	3500	260
RAHARO1S2	110 U	8.5 U	140 U	18000	110	57 U	130 U	120 J	13 J	140 J	3300	27 U	2500	300
RAHICN1D1	97 U	11 U	160 U	15000	84	16 U	84 U	100 J	15 J	130 U	2800 J	18 J	3300	250
RAHICN1S1	97 U	11 U	160 U	19000	87	16 U	84 U	150	18 J	180 J	3700 J	29 J	3100	350
RAHICN1S2	97 U	11 U	160 U	16000	94	16 U	84 U	140 J	22 J	130 U	3000 J	16 U	2900	240
RAHYFS1D1	73 U	11 U	150 U	18000	83 J	25 U	120 U	120	11 J	74 U	2700	25 U	1900	190
RAHYFS1S1	73 U	11 U	150 U	19000	100	25 U	120 U	130	13 J	74 U	3200	25 U	310	320
RAHYFS1S2	73 U	11 U	150 U	21000	92	25 U	120 U	140	19 J	74 U	3600	25 U	270	290
RAKICA1D1	110 U	9.2 J	140 U	17000	78 J	57 U	130 U	130 J	11 U	160 J	2500	27 U	2200	280
RAKICA1S1	110 U	8.5 U	140 U	20000	86 J	57 U	130 U	130 J	17 J	120 J	3300	27 U	770	330
RAKICA1S2	110 U	15 J	140 U	20000	130	57 U	130 U	160	22 J	110 U	3500	27 U	1700	320
RAMAHE1D1	73 U	11 U	150 U	18000	98	25 U	120 U	120	10 J	110 J	3500	25 U	840	270
RAMAHE1S1	97 U	11 U	160 U	18000	100	16 U	84 U	180	17 J	130 U	3600 J	16 U	1100	320
RAMAHE1S2	73 U	11 U	150 U	17000	79 J	25 U	120 U	150	10 J	120 J	4200	25 U	1200	280
RAMIWL1D1	73 U	11 U	150 U	13000	86 J	25 U	120 U	160	18 J	110 J	3200	25 U	950	290
RAMIWL1S1	73 U	11 U	150 U	19000	91	25 U	120 U	110 J	19 J	74 U	2700	25 U	140 J	270
RAMIWL1S2	73 U	11 U	150 U	15000	97	25 U	120 U	120	9.8 U	74 U	3100	25 U	1100	350
RAPIME1D1	73 U	11 U	150 U	17000	99	25 U	120 U	150	9.8 U	110 J	3000	25 U	480	300
RAPIME1S1	73 U	11 U	150 U	19000	87	25 U	120 U	130	17 J	100 J	3900	25 U	370	330
RAPIME1S2	73 U	11 U	150 U	18000	98	25 U	120 U	130	20 J	74 U	3300	25 U	360	340
RAPKMI1D1	73 U	11 U	150 U	18000	73 J	25 U	120 U	550	19 J	75 J	3500	25 U	260	150
RAPKMI1S1	73 U	11 U	150 U	21000	71 J	25 U	120 U	400	15 J	120 J	4500	25 U	370	270
RAPKMI1S2	73 U	11 U	150 U	23000	86	25 U	120 U	460	13 J	140 J	3700	25 U	660	230
RAPKWT1D1	73 U	11 U	150 U	19000	74 J	25 U	120 U	540	25 J	130 J	3500	26 J	560	150

U - The analyte was not detected above the detection limit. the detection limit is reported.

J - The associated numerical value is an estimated quantity between the detection limit and the quantitation limit.

TABLE 1B

Rico Argentine

SPECTRACE 9000 XRF DATA (PPM)

ID	Hg	Mo	Ni	K	Rb	Se	Ag	Sr	Th	Sn	Ti	U	Zn	Zr
RAPKWT1S1	73 U	11 U	150 U	21000	96	25 U	120 U	390	18 J	150 J	4200	25 U	420	260
RAPKWT1S2	73 U	11 U	150 U	22000	120	25 U	120 U	360	20 J	180 J	4700	25 U	530	310
RARIFE1D1	110 U	8.5 U	160 J	16000	63 J	57 U	130 U	120 J	11 U	140 J	2300	27 U	430 J	260
RARIFE1D1D	110 U	8.5 U	140 U	16000	99 J	57 U	130 U	130 J	11 U	180 J	2100	27 U	480 J	260
RARIFE1S1	110 U	8.5 U	140 U	19000	77 J	57 U	130 U	140 J	11 U	110 U	3000	27 U	530 J	320
RARIFE1S2	110 U	8.5 U	140 U	20000	94 J	57 U	130 U	130 J	11 U	140 J	2600	27 U	450 J	270
RARIFE1S3	110 U	8.9 J	170 J	20000	100 J	57 U	130 U	120 J	20 J	160 J	3500	27 U	870	300
RARIFE1S3B	110 U	8.5 U	140 U	2200 U	32 U	57 U	130 U	44 U	11 U	110 U	570 U	27 U	170 U	30 U
RARIGS1D1	73 U	11 U	150 U	15000	87	25 U	120 U	100 J	20 J	94 J	3000	25 U	1400	260
RARIGS1S1	73 U	11 U	150 U	15000	73 J	25 U	120 U	110 J	12 J	160 J	2900	25 U	3000	300
RARIGS1S1D	73 U	11 U	150 U	16000	72 J	25 U	120 U	100 J	14 J	180 J	3600	25 U	2800	250
RARIGS1S2	73 U	11 U	150 U	18000	87	25 U	120 U	130	30 J	130 J	3400	25 U	3000	290
RARIGS1S3	73 U	11 U	150 U	17000	69 J	25 U	120 U	160	13 J	98 J	3300	25 U	1200	340
RARILE1D1	110 U	8.5 U	150 J	15000	80 J	57 U	130 U	140 J	15 J	170 J	2800	27 U	1200	240
RARILE1S1	110 U	8.5 U	140 U	18000	82 J	57 U	130 U	150	11 U	150 J	4000	27 U	1200	280
RARILE1S2	110 U	8.5 U	290 J	19000	100 J	57 U	130 U	140 J	21 J	150 J	3700	27 U	1100	320
RARILE1S3	110 U	8.5 U	140 U	16000	67 J	57 U	130 U	180	11 U	150 J	2400	27 U	390 J	260
RASDGR1D1	73 U	11 U	150 U	16000	60 J	25 U	120 U	190	11 J	110 J	1700	25 U	99 J	130
RASDGR1S1	73 U	11 U	150 U	20000	81 J	25 U	120 U	78 J	9.8 U	120 J	3100	25 U	150 J	230
RASDGR1S1B	73 U	11 U	150 U	1300 U	26 U	25 U	120 U	33 U	9.8 U	74 U	460 U	25 U	68 U	27 J
RASDGR1S2	73 U	11 U	150 U	23000	89	25 U	120 U	130	9.8 U	74 U	3600	25 U	250	300
RASDGR1S2D	73 U	11 U	150 U	23000	87	25 U	120 U	95 J	29 J	100 J	3300	25 U	180 J	310
RASDGR1S3	73 U	11 U	150 U	25000	98	25 U	120 U	97 J	19 J	140 J	3600	25 U	130 J	290
RASDGR1S4	73 U	11 U	150 U	25000	110	25 U	120 U	85 J	21 J	120 J	3700	25 U	210 J	250
RASHBE1D1	97 U	11 U	160 U	18000	100	16 U	84 U	110 J	19 J	130 U	3800 J	16 U	930	390
RASHBE1S1	97 U	11 U	160 U	20000	110	16 U	84 U	140 J	21 J	140 J	3500 J	21 J	1700	300
RASHBE1S2	97 U	11 U	160 U	18000	91	16 U	84 U	120 J	28 J	130 J	3200 J	17 J	2600	270
RASHCO1D1	97 U	11 U	160 U	15000	88	16 U	84 U	110 J	28 J	140 J	2400 J	16 U	3900	220
RASHCO1S1	97 U	11 U	160 U	18000	90	16 U	84 U	130 J	23 J	180 J	3500 J	23 J	4500	310
RASHCO1S2	97 U	11 U	160 U	17000	88	16 U	84 U	140 J	25 J	130 U	3300 J	16 U	3500	280
RASHDA1D1	97 U	11 U	160 U	18000	99	16 U	84 U	160	14 U	150 J	2500 J	20 J	910	210
RASHDA1S1	97 U	16 J	160 U	20000	110	16 U	84 U	150	18 J	130 U	3900 J	16 U	1200	330
RASHDA1S2	97 U	11 U	160 U	19000	100	16 U	84 U	180	14 U	130 U	3300 J	18 J	3500	260
RASICU1D1	110 U	8.5 U	140 U	17000	140	57 U	130 U	180	11 U	130 J	2800	27 U	310 J	280
RASICU1S1	110 U	8.5 U	190 J	22000	140	57 U	130 U	97 J	14 J	140 J	3100	27 U	380 J	290

U - The analyte was not detected above the detection limit. the detection limit is reported.

J - The associated numerical value is an estimated quantity between the detection limit and the quantitation limit.

TABLE 1B

Rico Argentine

SPECTRACE 9000 XRF DATA (PPM)

ID	Hg	Mo	Ni	K	Rb	Se	Ag	Sr	Th	Sn	Ti	U	Zn	Zr
RASICU1S2	110 U	8.5 U	190 J	20000	100 J	57 U	130 U	190	11 U	200 J	2900	27 U	310 J	290
RASIKI1D1	110 U	8.5 U	140 U	19000	110 J	57 U	130 U	100 J	11 U	110 U	3100	27 U	210 J	280
RASIKI1S1	110 U	12 J	140 U	26000	140	57 U	130 U	91 J	11 U	160 J	3100	27 U	340 J	290
RASIKI1S2	110 U	8.5 U	140 U	27000	190	57 U	130 U	100 J	17 J	110 U	3800	27 U	300 J	290
RASIST1D1	110 U	12 J	140 U	20000	120	57 U	130 U	96 J	30 J	150 J	2900	27 U	270 J	230
RASIST1S1	110 U	8.5 U	140 U	21000	110	57 U	130 U	170	11 U	160 J	3200	27 U	500 J	280
RASIST1S1D	110 U	8.5 U	140 U	21000	120	57 U	130 U	160	26 J	170 J	3000	27 U	440 J	280
RASIST2S1	110 U	8.5 U	140 U	22000	110	57 U	130 U	99 J	13 J	140 J	3400	27 U	420 J	300
RASIST3S1	110 U	8.5 U	140 U	25000	130	57 U	130 U	130 J	17 J	110 U	3800	27 U	220 J	250
RASOBO1D1	97 U	11 U	160 U	18000	100	16 U	84 U	150 J	20 J	130 U	3200 J	16 U	2100	250
RASOBO1S1	97 U	11 U	160 U	25000	120	16 U	84 U	210	37 J	130 U	2500 J	28 J	800	460
RASOBO1S2	97 U	11 U	160 U	19000	110	16 U	84 U	120 J	15 J	160 J	3200 J	20 J	1800	270
RASOHE1D1	97 U	11 U	160 U	19000	110	16 U	84 U	250	20 J	220 J	2500 J	16 U	18000	160
RASOHE1S1	97 U	11 U	160 U	22000	68	16 U	84 U	120 J	17 J	130 U	3600 J	16 U	560	320
RASOHE1S2	97 U	11 U	160 U	20000	140	16 U	84 U	140 J	39 J	190 J	3100 J	16 U	13000	300
RASOHE1S2B	97 U	11 U	160 U	2900 U	15 U	16 U	84 U	44 U	14 U	130 U	1300 U	16 U	88 U	46 J
RASOHE1S3	97 U	11 U	160 U	23000	96	16 U	84 U	990	22 J	130 U	3100 J	16 U	3300	230
RASOHE1S3D	97 U	11 U	160 U	25000	120	20 J	84 U	1600	31 J	180 J	3000 J	16 U	3100	270
RASOIR1D1	97 U	11 U	160 U	15000	100	16 U	84 U	110 J	31 J	130 U	2200 J	16 U	800	230
RASOIR1S1	97 U	11 U	160 U	20000	100	16 U	84 U	150	27 J	130 U	2800 J	16 U	1000	320
RASOIR1S2	97 U	11 U	160 U	20000	92	16 U	84 U	120 J	21 J	130 U	3300 J	16 U	880	310
RASVCN1D1	97 U	11 U	160 U	17000	71	16 U	84 U	150	14 U	140 J	3500 J	20 J	4800	270
RASVCN1D1B	97 U	11 U	160 U	2900 U	15 U	16 U	84 U	44 U	14 U	130 U	1300 U	16 U	88 U	30 U
RASVCN1S1	97 U	11 U	160 U	17000	80	16 U	84 U	150	16 J	180 J	3700 J	16 U	4400	270
RASVCN1S2	97 U	11 U	160 U	15000	81	16 U	84 U	140 J	14 U	130 U	3500 J	16 U	4700	290
RASVCN2D1	97 U	11 U	160 U	17000	120	16 U	84 U	130 J	32 J	160 J	3300 J	16 U	4500	220
RASVCN2S1	97 U	11 U	160 U	21000	67	16 U	84 U	300	14 U	130 U	3000 J	16 U	6700	280
RASVCN2S1D	97 U	11 U	160 U	20000	86	16 U	84 U	260	20 J	130 U	3000 J	16 U	6600	280
RASVCN2S2	97 U	11 U	160 U	19000	100	16 U	84 U	150	15 J	130 U	3600 J	16 U	3500	320
RASVFO1D1	73 U	11 U	150 U	17000	100	25 U	120 U	120	9.8 U	74 U	2100	25 U	860	210
RASVFO1S1	73 U	11 U	150 U	17000	94	25 U	120 U	190	31 J	190 J	4000	25 U	2300	270
RASVFO1S1D	73 U	11 U	150 U	19000	100	25 U	120 U	190	12 J	110 J	4000	25 U	2500	290
RASVFO1S2	73 U	11 U	150 U	19000	110	25 U	120 U	160	18 J	160 J	3600	25 U	1100	310
RASVFO2D1	97 U	11 U	160 U	14000	77	16 U	84 U	160	18 J	190 J	2700 J	16 U	4800	170
RASVFO2S1	97 U	11 U	160 U	17000	94	16 U	84 U	180	19 J	130 U	3400 J	16 U	4100	210

U - The analyte was not detected above the detection limit. the detection limit is reported.

J - The associated numerical value is an estimated quantity between the detection limit and the quantitation limit.

TABLE 1B

Rico Argentine

SPECTRACE 9000 XRF DATA (PPM)

ID	Hg	Mo	Ni	K	Rb	Se	Ag	Sr	Th	Sn	Ti	U	Zn	Zr
RASVFO2S2	97 U	11 U	160 U	18000	90	16 U	84 U	160	19 J	130 U	2700 J	16 U	1800	320
RASVFO3D1	97 U	11 U	160 U	14000	100	16 U	84 U	230	20 J	130 U	2800 J	16 U	3300	210
RASVFO3S1	97 U	11 U	160 U	17000	96	16 U	84 U	170	24 J	160 J	3000 J	16 U	3100	250
RASVFO3S2	97 U	11 U	160 U	17000	100	16 U	84 U	240	20 J	180 J	3000 J	16 U	3300	260
RASVKR1D1	73 U	11 U	150 U	15000	120	25 U	120 U	160	17 J	74 U	2900	25 U	2900	250
RASVKR1S1	73 U	11 U	150 U	19000	90	25 U	120 U	160	9.8 U	160 J	2900	25 U	2300	240
RASVKR1S2	73 U	11 U	150 U	17000	95	25 U	120 U	140	14 J	74 U	3300	25 U	1600	330
RAYEMU1D1	97 U	11 U	160 U	15000	110	16 U	84 U	120 J	25 J	150 J	2900 J	16 U	3300	230
RAYEMU1S1	97 U	11 U	160 U	19000	110	16 U	84 U	130 J	15 J	150 J	3400 J	16 U	3000	310
RAYEMU1S2	97 U	11 U	160 U	19000	75	16 U	84 U	130 J	28 J	150 J	3100 J	16 U	2800	320

U - The analyte was not detected above the detection limit. the detection limit is reported.

J - The associated numerical value is an estimated quantity between the detection limit and the quantitation limit.

APPENDIX B
Analytical Data and Validation Reports
(under separate cover)